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Preferred and Alternate Routes: BPA 500-Kilovolt Line From Garrison-West

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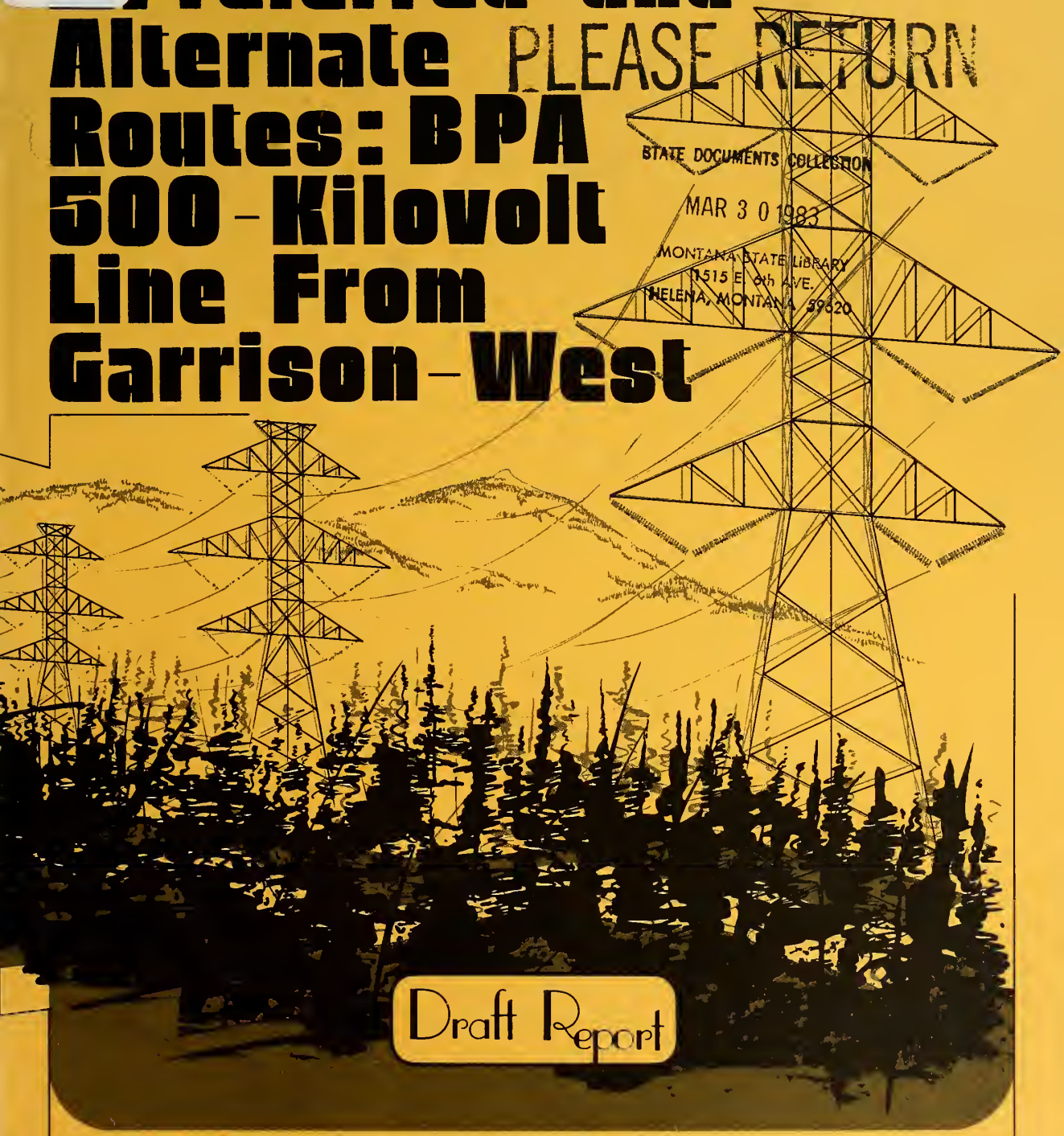

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PREFERRED AND ALTERNATE ROUTES FOR THE BONNEVILLE POWER ADMINISTRATION'S 500-kV TRANSMISSION LINE FROM GARRISON WEST

DRAFT REPORT TO THE BOARD OF NATURAL RESOURCES AND CONSERVATION, SUPPLEMENTING THE FEDERAL DRAFT ENVIRONMENTAL IMPACT STATEMENT ON THE GARRISON-SPOKANE 500-kV TRANSMISSION PROJECT

February 1983

DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION
ENERGY DIVISION
32 S. Ewing
Helena, MT

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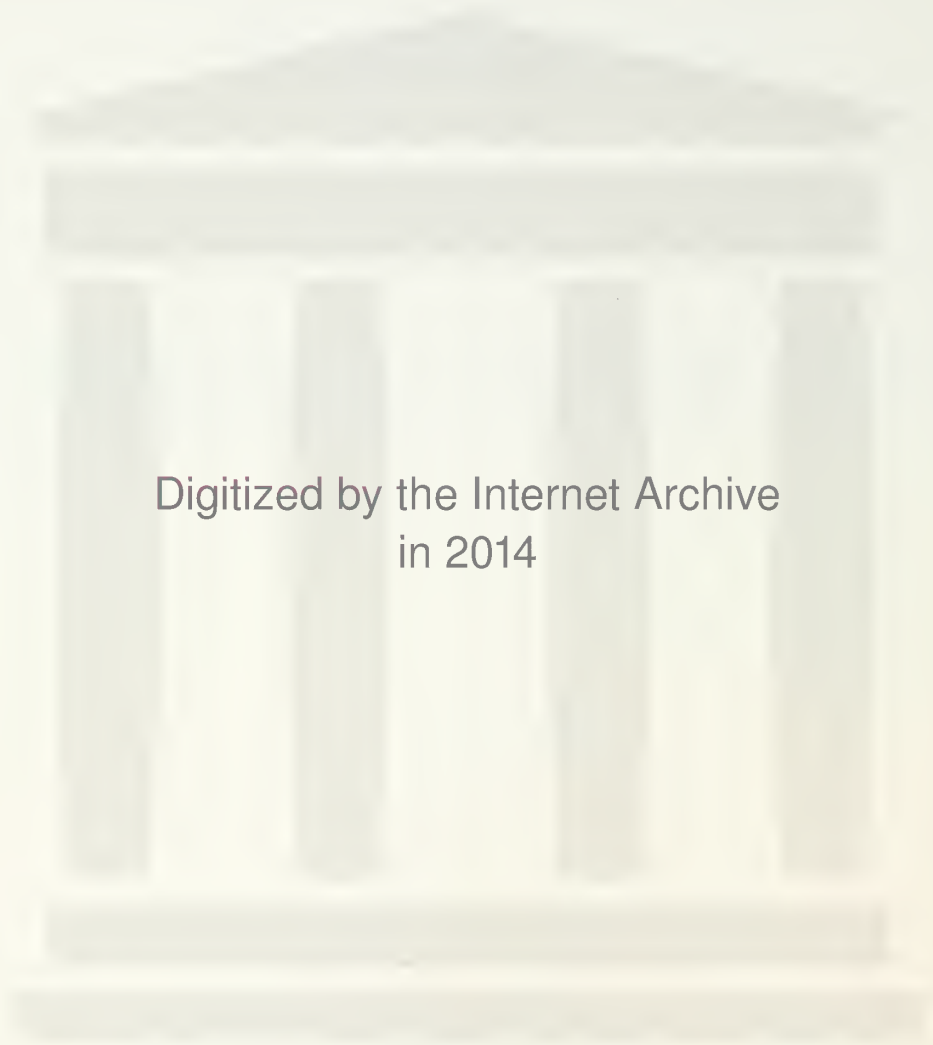

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SUMMARY

THE PROPOSED PROJECT

The Bonneville Power Administration (BPA) has proposed construction of a 500-kV transmission line from Garrison, Montana, to Bell, Washington, near Spokane. The line would carry power 430 miles from the generating complex at Colstrip to a substation near the Idaho border, and on to the Pacific Northwest. Construction of the powerline is scheduled to begin with right-of-way clearing in May 1983, and to conclude in late 1985 to meet the start-up date of Colstrip unit 4.

The route preferred by BPA and DNRC would connect to a substation that would be built near Taft, Montana, which is about 6.0 mi east of the Idaho border and 4.0 mi north of Interstate Highway 90. Other routes that were considered would connect either to an existing substation at Hot Springs or to a new substation that would be built near Plains.

HISTORY OF THE PROPOSED PROJECT

The construction of a 500-kV line for delivering power from Colstrip to the Pacific Northwest has a history extending back 10 years. Originally proposed as part of the Colstrip 3 and 4 projects in 1973, the line initially was to be built by MPC from Colstrip to a substation near Hot Springs, Montana, the eastern terminus of the Northwest's 500-kV system. In 1976 the Board of Natural Resources and Conservation approved the Colstrip project, including a route for the 500-kV line from Colstrip through Broadview, Townsend and Helena, to Hot Springs.

In 1977, MPC, citing difficulty in obtaining easements across the Flathead Reservation, asked BPA to build the line from Townsend west. BPA agreed, and issued an environmental impact statement (EIS) suggesting a different route than approved by the Board. Subsequent legal action culminated in a ruling that BPA must meet the "substantive standards" of Montana's Major Facility Siting Act. This ruling led the Department of Natural Resources and Conservation to issue this addendum to the BPA EIS, to address public concern and supplement information in the BPA document.

SETTING OF THE PROPOSED PROJECT

Western Montana is mountainous with most agriculture and human habitation located in valley bottoms, and with much forested land managed by the U.S. Forest Service in the mountains. The Forest Service land is important for timber, wildlife, and recreation, and large portions of it have been set aside for management as wilderness or primitive areas that could not be crossed by transmission lines. The entire area is valued for its scenery, both by tourists and local residents.

SUMMARY OF PUBLIC COMMENT AND OPINION

The concerns of the residents regarding the proposed powerline were sought in a series of public hearings that BPA held in the vicinity of the various route alternatives. DNRC had representatives at all 14 meetings as observers, and held two additional meetings of its own, one in Ovando and one Arlee. The range of expressed public concern is shown below.

Many people questioned BPA's conclusion that there would be no health effects and pointed out conflicts in the data. Specific concerns included: electrical shocks, fears for the safety of children playing near the line or towers, lightning hazards, human health hazards that might be caused by the line, health effects on livestock and consequent damage to the reputation of ranchers' cattle.

The proposed line was seen as an economic burden to the counties, because no taxes would be paid on the federally-owned facilities. Because BPA does not make payments in lieu of taxes, numerous people advocated the use of impact aid payments from the agency to the counties to defray expenses caused by the project, such as increased road maintenance costs or fire and police protection.

Many residents suggested that public projects belong on public land away from people and houses. Landowners were concerned that the proximity of the powerline could lower property values and restrict further residential development in populated areas. Potential loss of timber-producing land was raised as an issue, and forest managers and landowners want location of powerline access roads to be coordinated with timber management needs. Agricultural concerns included the removal of land from production by tower bases and access roads, inconveniences to farming operations, and interference with mechanical irrigation.

Enjoyment of the land as a way of life was said to be one reason people opposed the powerline. Many noted that they had chosen to live in western Montana because of its scenic qualities and that a transmission line would detract from the natural beauty and reduce the quality of life. Many raised the possibility of decreased recreational quality at recreational sites. Particular concern was expressed for the Rattlesnake National Recreation Area.

Residents said they were worried about possible affects on big game, protected species, and gamefish. Loss of important big game habitat was an issue, as was increased hunter access to wildlife by means of access roads. Increased runoff, erosion, and stream sedimentation associated with construction of the transmission line and access roads was identified as a concern. Potential herbicide pollution of water resources was seen as a possible problem.

ENVIRONMENTAL IMPACTS

DNRC's analysis of the potential effects of the proposed transmission line is intended to supplement and correct BPA information, and to address concerns expressed by Montanans.

BPA's first, second, and third choice routes are called the Taft, Plains, and Hot Springs routes after the existing or proposed substations to which they would convey electricity (Figure 1). DNRC's preferred route is the Taft South Route. The impacts summarized below would occur to varying degrees for all the routes.

Socioeconomic Effects

There would be a small short-term increase in population during construction of the transmission line, which could cause increased spending by local governments. Construction of the transmission line would cause short-term impacts from dust, noise, and interference with agriculture, and some minor strain on public and private services.

Economic benefits during construction would be short-term. There would be about 135 short-term jobs for Montanans, but no long-term employment. There also would be short-term income benefits for businesses selling goods and services to construction contractors and workers. BPA would have no Montana tax liability, so taxing jurisdictions crossed by the line would receive no increase in their tax base.

Long-term impacts of the project would be more important. These would include visual deterioration of the landscape, additional agricultural impacts such as interference with irrigation practices, increased electrical hazard risk, and unknown effects to land values. Many residents opposed to the line would experience frustration and resentment.

Electrical Fields and Health Effects

Electrical fields produced by 500-kV transmission lines have not been demonstrated to affect the health of humans or animals, but some minor biological effects of unknown consequence have been demonstrated in test animals exposed to electrical fields comparable in strength to those that would exist under the proposed powerlines.

Other impacts that could be caused by electrical fields surrounding the line include noise during wet weather, radio and television interference, and electric shocks. Most of these impacts could be avoided through adherence to BPA's engineering practices and construction manual (Appendix B).

Wildlife & Aquatic Habitat

There would be a reduction in the quality of big game security habitat due to the construction and maintenance of access roads, and without road control hunters could reach previously less accessible areas, increasing short-term harvests and reducing long-term hunting quality. Construction of access roads could cause sedimentation and degrade water quality and spawning habitat in small mountain streams.

Cultural Resources

Approximately 300 archaeological and historical sites are located in the various routes. Many other unknown sites are believed to exist there. Construction of the powerline could destroy or damage some sites. New or improved access roads could lead to increased vandalism of sites or theft of artifacts. The scenic character of some types of sites, such as buffalo jumps or rock art, could be disrupted by the visual intrusion of the line.

Land Use

A strip of land at least 125 ft wide from Garrison to the Idaho border would be committed to the transmission line, eliminating most other possible uses. The transmission line would cross some privately-owned land, which would require easements from the landowners. One to four miles of access roads would be built for each mile of transmission line. Most of the impacts caused by soil disturbance would result from these roads.

Recreation and Aesthetics

The transmission towers, right-of-way clearing, and access roads would disrupt scenic quality along most of the line. The visual intrusion would cause serious impacts in the western Montana landscape, especially in residential areas and recreation settings where concern for scenic quality is high.

Construction Costs

The proposed project would cost $200,872,000 if the Hot Springs Route were used, $212,000,000 for the Plains Route, or $222,125,000 for the Taft Route. Two-thirds of the total costs would be for the portion of the line in Montana. The Taft and Plains routes are more expensive because both would require construction of a new substation, more new access

roads, and more steel for towers. The steep terrain on these routes also raises costs. There has been no calculation of the cost of reducing impacts along any of the routes, so cost totals would be higher.

PROPOSED ROUTES

DNRC began its study with the hope that it could find a route that would have less impact and be more acceptable to Montanans than BPA's proposed routes. After reviewing BPA's draft EIS in October 1982, DNRC began collecting information and performing analyses to evaluate these routes. Additional information was necessary because BPA's draft EIS did not provide the information necessary to choose an environmentally preferred route according to the requirements of the Montana Major Facility Siting Act.

DNRC mapped environmental features at a more detailed scale than BPA, and gathered additional data to make the environmental analysis more complete. DNRC also evaluated a route over Jocko Pass, which was the route approved by the Board as part of the Colstrip 3 and 4 project.

ROUTE RECOMMENDATION

After research and analysis were complete, representatives of DNRC and BPA met to compare evaluations of routes for the transmission line. The meeting resulted in a joint siting recommendation for the Montana portion of the Garrison-Bell 500-kV transmission system. The recommended route is called the Taft South Route, because it would pass through a new substation at Taft, near the Idaho border (Figure 1). The "south" in the Taft South Route is used to avoid confusion with the Taft North Route, which takes a more northerly path from Garrison to Miller Creek.

Given the high level of public interest demonstrated at hearings on the project, DNRC agreed with BPA that the line should avoid inhabited areas as much as possible. Table 11 shows the comparisons of the Taft South Route with several other less favorable routes examined by DNRC and BPA.

Although DNRC agreed with BPA that the route selected presented the best opportunity to avoid or reduce impacts, DNRC pointed out that the impacts actually experienced would depend upon the exact location of the line within the 4-mile-wide corridor that was studied. DNRC requested BPA to allow DNRC participation in selecting the location of the line within the corridor. It was hoped that this would allow the best opportunity to avoid sensitive areas, such as residences and irrigated farmland. There is high public concern about the line in the small community of Maxville, south of Drummond, and DNRC hopes to ensure the line is located to avoid impacts there as much as possible.

The Taft South Route would affect fewer people and fewer homes than the other routes examined, but the potential for adverse impacts to natural systems is high. DNRC and BPA recommend numerous measures to reduce or avoid impacts, but no amount of such effort can eliminate all such effects.

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ABBREVIATIONS

ACHP	Advisory Council on Historic Preservation
BPA	Bonneville Power Administration
BLM	Bureau of Land Management
dBA	A-weighted decibel (Meaure of loudness)
DFWP	Montana Department of Fish, Wildlife and Parks
DHES	Montana Department of Health and Environmental Sciences
DNRC	Montana Department of Natural Resources and Conservation
DSL	Montana Department of State Lands
EIS	Environmental Impact Statement
ESEEROC	Empire State Electrical Energy Research Corporation
FAA	Federal Aviation Administration
FLPMA	Federal Land Policy and Management act
ft	foot or feet

kV	kilovOlt
kV/m	KilovOlt per meter
lb, lbs	pound, pounds
LRA	Local Routing Alternative
MCA	Montana Codes Annotated
MDOC	Montana Department of Commerce
MFSA	Montana Major Facility Siting Act
mi	mile, miles
MPC	Montana Power Company
MVA	MegavOlt amperes
MW	Megawatt
RARE	Roadless Area Review and Evaluation
SHPO	Montana State Historic Preservation Office
USDA	United States Department of Agriculture
USDI	United States Department of the Interior

USDOE	United States Department of Energy
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VFR	Visual Flight Rules
vs	Versus
WSCC	Western Systems Coordinating Council (Federally established group charged with establishing reliability criteria for electrical transmissioin systems)
WWP	Washington Water Power
yr	Year

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FIGURE 1

Alternative Routes for the Garrison-West 500 KV Line

— Taft South (118, 129, 131, 132, 134, 135, 137, 138, 140, 142, 143, 145, 10,15, 26A.)

– – – Taft North (101, 102, 107, 108,120, 121, 127, 128, 138, 140, 142, 143, 145, 10, 15, 26A.)

BPA Segments

DNRC Segments

o Selected Cities

Substations

Represents beginning or end of segment

Study Area

Blackfoot River Conservation and Recreation Management Area

Flathead Indian Reservation

SPECIALLY MANAGED AREAS

- Mission Mountain Tribal Wilderness Area
- Mission Mountain Wilderness Area
- National Bison Range
- South Fork Tribal Primitive Area
- Rattlesnake Wilderness Area
- Rattlesnake National Recreation Area
- Clearwater Game Range

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SCALE 0 6 12

February 1983

Department of Natural Resources and Conservation • Energy Division
32 So. Ewing • Helena, Montana 59620

CHAPTER 1
INTRODUCTION

This report is a draft addendum to the federal draft environmental impact statement (EIS) on Bonneville Power Administration's (BPA) Garrison-Spokane 500-kV Transmission Project. As such, it supplements the federal document.

The Montana Major Facility Siting Act (MFSA) requires the Montana Department of Natural Resources and Conservation (DNRC) to evaluate the effects of energy facilities and to report the findings to the Board of Natural Resources and Conservation (the Board). This document provides the information necessary for the Board to determine if BPA's proposed project complies with the substantive standards of MFSA.

Before the Board can approve a route for the proposal it must determine (1) the nature of probable environmental impacts, (2) that the facility would cause minimum adverse environmental impacts considering the state of available technology and the nature and economics of the various alternatives, and (3) that the Department of Health and Environmental Sciences (DHES) has issued any permits required within its jurisdiction.

DHES is required to determine whether or not the proposed project complies with all laws it administers. For this project, BPA must secure four permits from DHES; (1) Air Quality Permit, (2) Montana Pollutant Discharge Elimination System Permit, (3) authorization to temporarily exceed water turbidity standards during construction, and (4) an open burning permit. The feasibility of complying with all permit requirements and standards under DHES's jurisdiction must be determined for the preferred and alternate locations of the proposed facility.

PROPOSED PROJECT

BPA plans to construct a double-circuit 500-kilovolt (kV) transmission line from a substation near Garrison, Montana, to an existing substation at Hot Springs or to a new substation that would be built either at Plains or Taft, Montana. BPA would then build a single-circuit 500-kV line from the substation to Bell, Washington. The proposed project would expand the Pacific Northwest power transmission system to integrate power from Colstrip into the system.

Montana Power Company (MPC) is currently building two single-circuit 500-kV transmission lines from Colstrip to a point southeast of Townsend, and BPA is building one double-circuit 500-kV line from there to the Garrison substation. These lines have received Board approval (DNRC 1982a and 1982b). Existing BPA and MPC 230-kV transmission lines would be connected to the Garrison substation but would not be adequate by themselves to carry Colstrip power to the utilities that own it. Construction of the proposed transmission lines and substation would strengthen the power system in western Montana and complete the facilities needed for transporting power from Colstrip to the 500-kV transmission system in Montana and then to the Pacific Northwest.

In its draft EIS, BPA specified a route through a new substation called Taft (6 mi from the Idaho border, 4 mi north of I-90) as its preferred route. Between July and October 1982, DNRC examined the Taft Route, other routes that BPA evaluated, variations of BPA's alternatives, and a route called the Jocko Route, which would pass 2.5 mi south of Jocko Pass and cross the Flathead Indian Reservation on its way to Hot Springs. Portions of the Jocko Route were recommended by the Board when the Colstrip units were authorized in 1976. At a November 1982 meeting in Helena, DNRC and BPA representatives jointly reviewed alternative routes and agreed that two variations of the Taft Route were the best and second best of all those examined. The route preferred by both DNRC and BPA is referred to as the Taft South Route and the second choice is the Taft North Route. These two routes are represented by green lines on Figure 1.

BPA's proposal for construction of the 500-kV line is to build four to five steel lattice towers about 175-ft tall per 1.0 mi of line. The proposed right-of-way would be 125-ft-wide. The towers would carry three bundles of conductors on each side, and would look like those on the cover of this report. BPA plans to complete construction of the project west of Garrison by the fall of 1985.

HISTORY OF THE PROPOSED PROJECT

In 1973, MPC, with four other utilities, submitted a proposal to the State of Montana to build two 700-megawatt (MW) coal-fired electrical generating units, called Units 3 and 4, at Colstrip, Montana. Transmission lines were planned to convey the Colstrip power about 430 mi west to Hot Springs in western Montana, from there the energy could be integrated into the Pacific Northwest power system.

STATE INVOLVEMENT

The Montana Utility Siting Act (now the Montana Major Facility Siting Act MFSA), enacted in 1973, requires the Board to determine the need for major energy projects and the environmental, social, and economic effects of building and operating such facilities in Montana. DNRC issued a draft and a final EIS in 1973 and 1975.

In July 1976, the Board approved the application to construct Colstrip Units 3 and 4 and associated transmission facilities, and granted MPC a Certificate of Environmental Compatibility and Public Need, subject to certain conditions.

FEDERAL INVOLVEMENT

BPA's participation initially was limited to construction of a transmission line from Hot Springs west. In 1977, citing difficulty in obtaining easements through the Flathead Reservation to Hot Springs, MPC requested BPA to construct the transmission line. The Administrator of BPA agreed to build transmission facilities west from Townsend, Montana. This action required a federal EIS. The final EIS recommended a route from Townsend past Boulder to Garrison, rather than through Helena as recommended by MPC and authorized by the Board. A new substation would also be built in the Garrison area.

FEDERAL STATE AND LOCAL LEGAL ISSUES

Because the federally-approved corridor diverged from that approved by the Board in 1976, Governor Thomas L. Judge requested federal acknowledgement of the state's jurisdiction in siting utilities. Authority cited for this request was Section 505 of the Federal Land Policy and Management Act (FLPMA)(43 USCA 1761 et seq). The Bureau of Land Management (BLM) and the U.S. Forest Service (USFS) have been involved in this project since 1973 because they administer federal lands that would be crossed by the transmission line and are subject to the mandates of FLPMA.

In his reply of August 7, Department of Energy Deputy Secretary John C. Sawhill rejected the claim of State jurisdiction. The "supremacy" clause of the U.S. Constitution exempts federal actions from state jurisdiction, except where specifically authorized by Congress. No such exception was made for BPA's proposed powerline.

In a letter dated February 6, 1981, the Missoula Board of County Commissioners sought agreement from BPA on issues of impact aid payments, underground installation of the line, compliance with MFSA, and location of future utility corridors. Shortly thereafter, Missoula County and several other parties sought an injunction against BPA, BLM, and USFS, to prevent construction of the proposed transmission line from Townsend to Bell.

On January 28, 1982, Federal District Judge Battin in Billings denied Missoula County's request for a preliminary injunction and concluded that BPA need not apply for a Montana certificate of environmental compatability so long as the substantive requirements of the MFSA are met. The precedent for this decision was the Columbia Basin Land Protective Association v. Schlesinger, wherein it was ruled that BPA had to comply with the standards of the Washington State siting statute. Also in Columbia Basin the judge ruled that BPA must submit the information which Washington needs to determine if BPA met the substantive standards of its siting act.

On March 3, 1981, Governor Ted Schwinden, for the State of Montana, sought a declaratory judgment in federal court that BPA's actions violated MFSA and that BPA, BLM, and USFS were violating FLPMA. The state also sought an order requiring BLM, USFS, and BPA to comply with FLPMA and MFSA.

On March 4, 1982, District Judge Battin issued a declaratory ruling, and ordered that BPA comply with the substantive requirements of MFSA. BPA submitted information to the state so it could decide if BPA had complied with the substantive standards of MFSA. BPA was scheduled to begin construction on the Townsend-Garrison segment of the transmission line in March 1982. DNRC studied the Townsend-Garrison segment for compliance with MFSA in March through June 1982. The Board approved BPA's route from Townsend to Garrison except the Missouri River crossing near Townsend. The Board wanted to move the river crossing to reduce impacts on natural resources. BPA sued, saying the new crossing would delay construction of the line and energization of Colstrip Unit 3.

In August 1982, Judge Battin ruled that the Board could not require a new crossing at the Missouri. He further ruled that MFSA has no clear substantive standards. The State of Montana is appealing this decision. In light of the complex legal decisions and uncertain applicability of MFSA to the proposed project, the State of Montana negotiated a contract with BPA to evaluate the remaining project from Garrison to the Montana-Idaho border.

THE REPORT TO THE BOARD

This report was written to: (1) document the impacts of the proposed transmission line, (2) evaluate alternate routes for the line, (3) recommend measures to reduce adverse impacts, (4) assess the reliability of the project, and (5) describe methods DNRC used to evaluate BPA's proposal.

The Board is scheduled to hold a hearing to gather comment on this report and on the proposed project. The hearing will be held in Missoula in early March to obtain comment to be published along with DNRC's response in a final addendum. BPA's draft EIS is available for inspection at the Department of Natural Resources and Conservation, 32 S. Ewing, Helena and at public libraries in Deerlodge, Drummond, Missoula, Frenchtown, Alberton, St. Regis, and Superior. On the basis of this final addendum, the Board will designate a final route and stipulate measures to reduce potential impacts. The Board's decision will be handed down in April 1983.

CHAPTER 2
ROUTES AND STUDY APPROACH

This chapter describes the main routes examined by BPA and DNRC and discusses DNRC's study approach in collecting data and evaluating all routes.

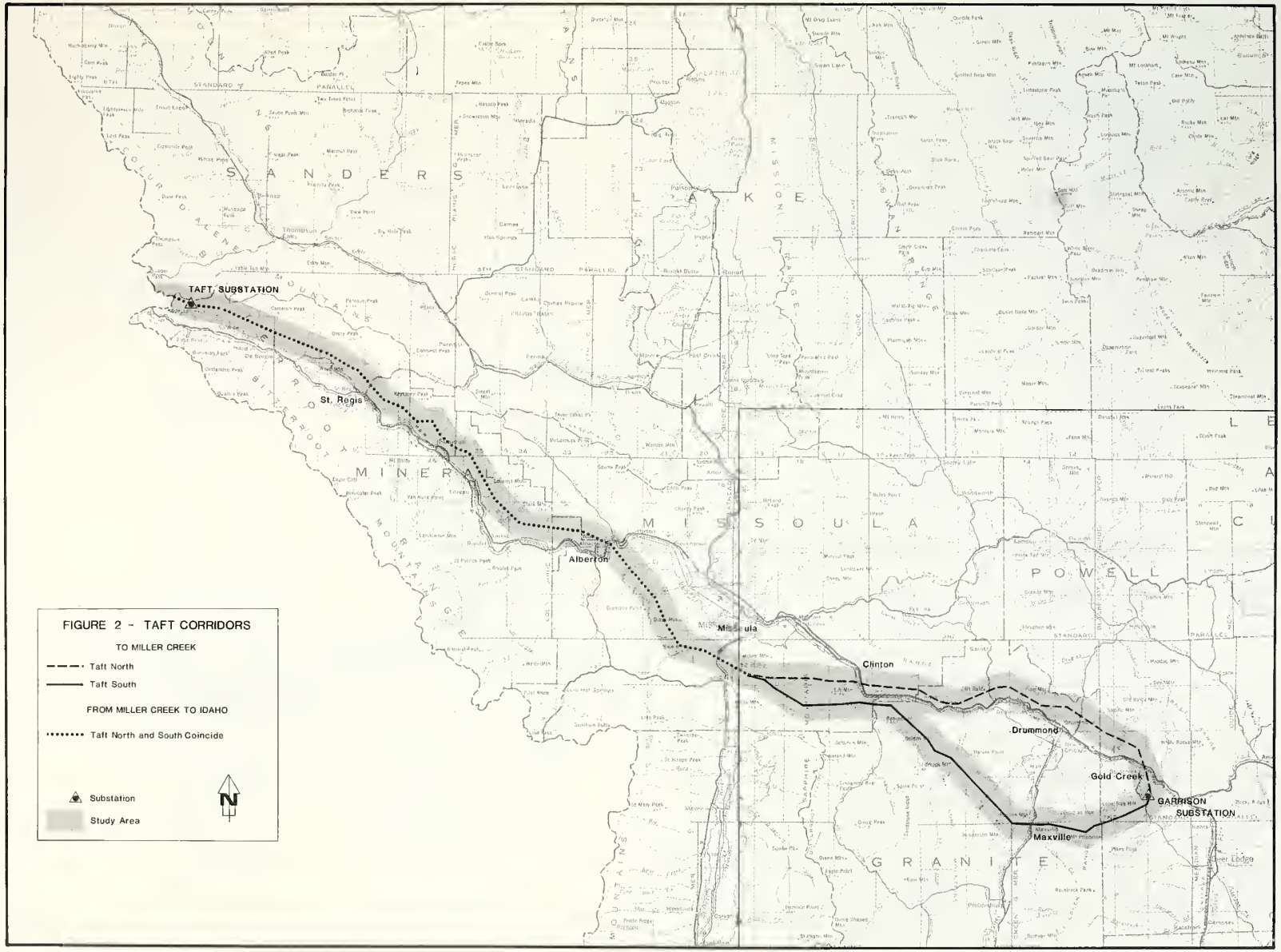
DESCRIPTION OF ROUTES

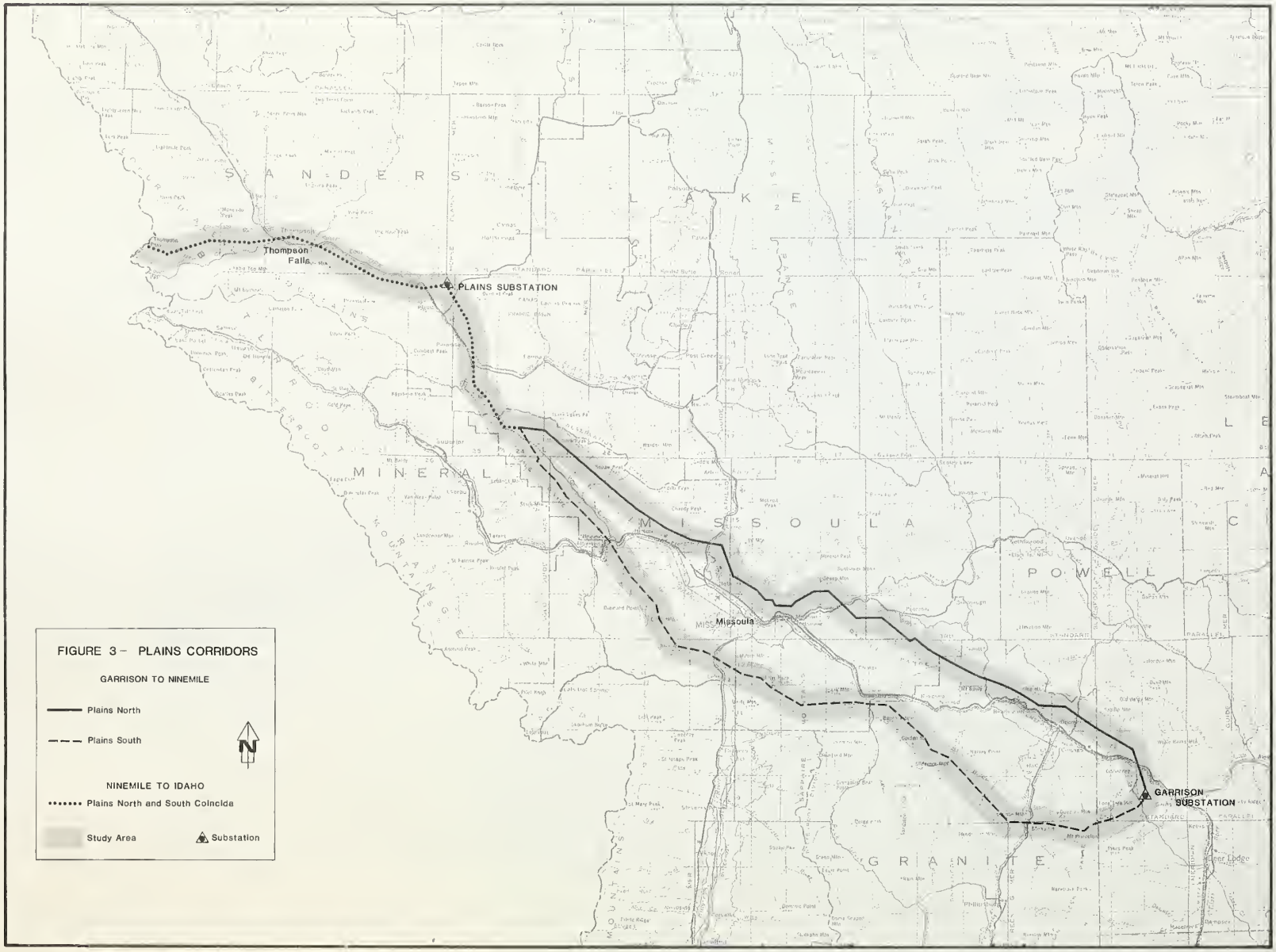
DNRC studied a 4.0-mi-wide area extending 2.0 mi on either side of BPA's proposed location of the lines. DNRC assumed the transmission line could be sited anywhere within the 4.0-mi-wide area to take advantage of favorable terrain or to avoid environmental problem areas. BPA's centerline was assumed to represent general conditions in the corridors, and was used to measure impacts along the routes. DNRC studied the sixty-four segments (shown in figure 1) identified by BPA or affected landowners and 2 new segments, LRA-C and 5B. Segment LRA-C was added to reduce potential impacts through the Drummond Valley. Segment 5B was linked to segments studied by BPA to compose the Jocko Route.

Routes to Taft, Plains, and Hot Springs were formed by linking segments or combination of segments together. DNRC's investigation indicated that a route through Taft would have far less impact than a route through Plains or Hot Springs. Six routes to Taft were analyzed as discussed in chapter 6. DNRC also evaluated routes to Plains and Hot Springs so an alternative route would be available if it proved impossible to site the line to the proposed Taft substation. This analysis is presented in chapter 6. The Taft South, Taft North, Plains North, Plains South, Hot Springs, and Jocko routes are described below.

THE TAFT SOUTH ROUTE

The Taft South Route is shown in figure 2, and the block defined by black lines shows the area where DNRC mapped Taft Route alternatives east of Miller Creek. The Taft North Route goes northwest from Garrison to Miller Creek where it joins the Taft South Route while the Taft South Route runs west southwest from Garrison to Miller Creek. Taft North and Taft South routes coincide from Miller Creek to the Montana-Idaho border. The Taft South Route heads west-southwest from the Garrison substation for about 2.5 mi where it intersects the MPC 161- and 230-kV lines, and then turns west, passing south of Jones Mountain. The route continues southwest over Highway 10A at Maxville and crosses Flint and Henderson creeks west of Maxville, then turns northwest to pass east of Sunrise Mountain. The route continues northwesterly over the John Long Mountains to 1.5 mi south of Bonita. The route then turns west, crossing Rock Creek about 1.5 mi south of its confluence with the Clark Fork and crossing Schwartz Creek about 5.0 mi southeast of Clinton, then continuing west across the Sapphire Mountains. East of Davis Point, the route turns northwest and crosses Miller Creek 1.0 mi north of Davis Point and again 7.0 mi southeast of Missoula. The route parallels Miller Creek for about 3.5 mi to a point 4.0 mi north of Lolo and then crosses the Bitterroot River. From there the route continues northwesterly for about 20.0 mi, crossing O'Brien, Deep, and Albert creeks. Midway between Alberton and Huson the route turns north and crosses I-90 and the Clark Fork. About 2.0 mi north of Alberton the route turns west, paralleling I-90 and the Clark Fork until crossing Nemote Creek, then turning northwest to a point 2.0 mi north of St. Regis where it again crosses the Clark Fork. The route passes south of Camels Hump and parallels I-90 north of Taft Peak. A new substation would be built just north of Taft Peak. The route would leave the substation heading northwest, passing into Idaho about 1.0 mi north and 2.5 mi east of Lookout Pass.


TAFT SUBSTATION
St. Regis
Alberton
Missoula
Clinton
Drummond
Gold Creek
GARRISON SUBSTATION
Maxville
SANDERS
LAKE
MINERAL
MISSOULA
POWELL
GRANITE
FIGURE 2 - TAFT CORRIDORS
TO MILLER CREEK
Taft North
Taft South
FROM MILLER CREEK TO IDAHO
Taft North and South Coincide
Substation
Study Area
N


Thompson Falls
PLAINS SUBSTATION
Missoula
GARRISON SUBSTATION
Deer Lodge
SANDERS
LAKE
MINERAL
MISSOULA
POWELL
GRANITE
FIGURE 3 – PLAINS CORRIDORS
GARRISON TO NINEMILE
Plains North
Plains South
N
NINEMILE TO IDAHO
Plains North and South Coincide
Study Area
Substation

THE TAFT NORTH ROUTE

The Taft North Route (see figure 2) runs north from the Garrison substation to a point about 1.5 mi east of Gold Creek, where it crosses I-90 and the Clark Fork. Continuing north, it crosses Hoover Creek about 3.0 mi northwest of Gold Creek, then turns west and parallels I-90 and the Clark Fork at a distance of about 2.0 mi, passing north of Drummond to about 1.0 mi north of Bearmouth. There the route turns southwest, still paralleling I-90 and the Clark Fork until it crosses both at Schwartz Creek, about 3.0 mi south of Clinton, and proceeds to a point on Miller Creek south of Miller Peak. There it joins the Taft South Route to the Idaho border.

THE PLAINS SOUTH ROUTE

The Plains South Route (see figure 3) is the same as Taft South from Garrison through Miller Creek to a point near the crossing of I-90 and the Clark Fork between Alberton and Huson. There the Plains South Route crosses I-90 and the Clark Fork about 0.5 mi north of the Taft crossing and heads northwest along the foothills of the Ninemile Divide, proceeds across Siegel Mountain, and continues northwest, crossing Highway 200 and the Flathead River about 0.5 mi east of the river's junction with the Clark Fork. The route continues northwest passing about 1.0 mi east of Paradise and 3.0 mi east of Plains. At a point 3.0 mi north of Plains the line would connect with a proposed substation, then heads west paralleling the Clark Fork. About 0.5 mi west of Weeksville the route twice crosses the Clark Fork and Highway 200, and then parallels them on the south side. The route crosses the Eddy Islands in the Clark Fork then crosses the Thompson River near Thompson Falls, and travels along the north side of the Thompson Falls valley. East of Thompson Falls the route turns south, crossing the Clark Fork, and then turns west and follows the ridge between Prospect Creek and Clear Creek drainages. The route crosses into Idaho over Thompson Pass.

THE PLAINS NORTH ROUTE

The Plains North Route (see figure 3) is the same as Taft North from Garrison to the vicinity of Bearmouth. About 4.0 mi east of Bearmouth the route crosses midway up Packer Gulch and continues northwest toward Potomac. The route turns west 3.0 mi south of Potomac, crossing Bear Creek and then turns northwest to cross the Blackfoot River and Highway 200 at a point 10.0 mi upstream from Bonner. Then the route turns west southwest, crossing Johnson Gulch and continuing west to a point north of Mount Jumbo where it turns northwest and crosses Rattlesnake, Grant, Butler, and LaValle creeks, proceeding to a point 2.0 mi north of Frenchtown then northwestward along Ninemile Creek joining the Plains South Route at the head of Ninemile Creek. From that point Plains North and Plains South coincide to the Montana-Idaho border.

THE HOT SPRINGS ROUTE

The Hot Springs Route (see figure 4) is the same as Plains North from Garrison to LaValle Creek. From LaValle Creek the route goes north, crossing Highway 93 north of Evaro and continuing north northwest past Arlee to the Highway 93 crossing of the Jocko River. Then the route passes Ravalli and follows BPA 230-kV lines to a point 0.5 mi east of Dixon. Here the route crosses the Flathead River and Highway 200, continues northwest to Hot Springs, and then west along Highway 28 to Plains. From there, the Hot Springs Route is the same as the Plains routes.

THE JOCKO ROUTE

The Jocko Route is the same as the Taft North Route from Garrison to Hoover Creek (see figure 4). From there, the Jocko Route heads northwest, paralleling the MPC 230-kV line near Campbell Mountain and continuing to a point 2.0 mi south of Ovando. The route turns west at this point and crosses the Blackfoot River south of the Clearwater Game Range. The route crosses the north half of Blanchard Flat (between Elbow and Salmon lakes), then continues northwest passing south of Placid Lake to the vicinity of Jocko Pass. This route parallels the MPC 230-kV line through the Confederated Salish and Kootenai Tribal Primitive area 2.0 mi southwest of Jocko Pass, then heads northwest, crossing the North Fork of Jocko River, to a point 2.5 mi south of St. Marys Lake. The route crosses Highway 93 between Ravalli and St. Ignatius, then crosses the northeast corner of the National Bison Range. The route continues across Burlington Northern Railroad tracks 2.0 mi east of Moiese, then turns north northwest to cross the Flathead River about 8.0 mi north of Dixon. This route joins the Hot Springs Route 1.5 mi south of the Little Bitterroot River.

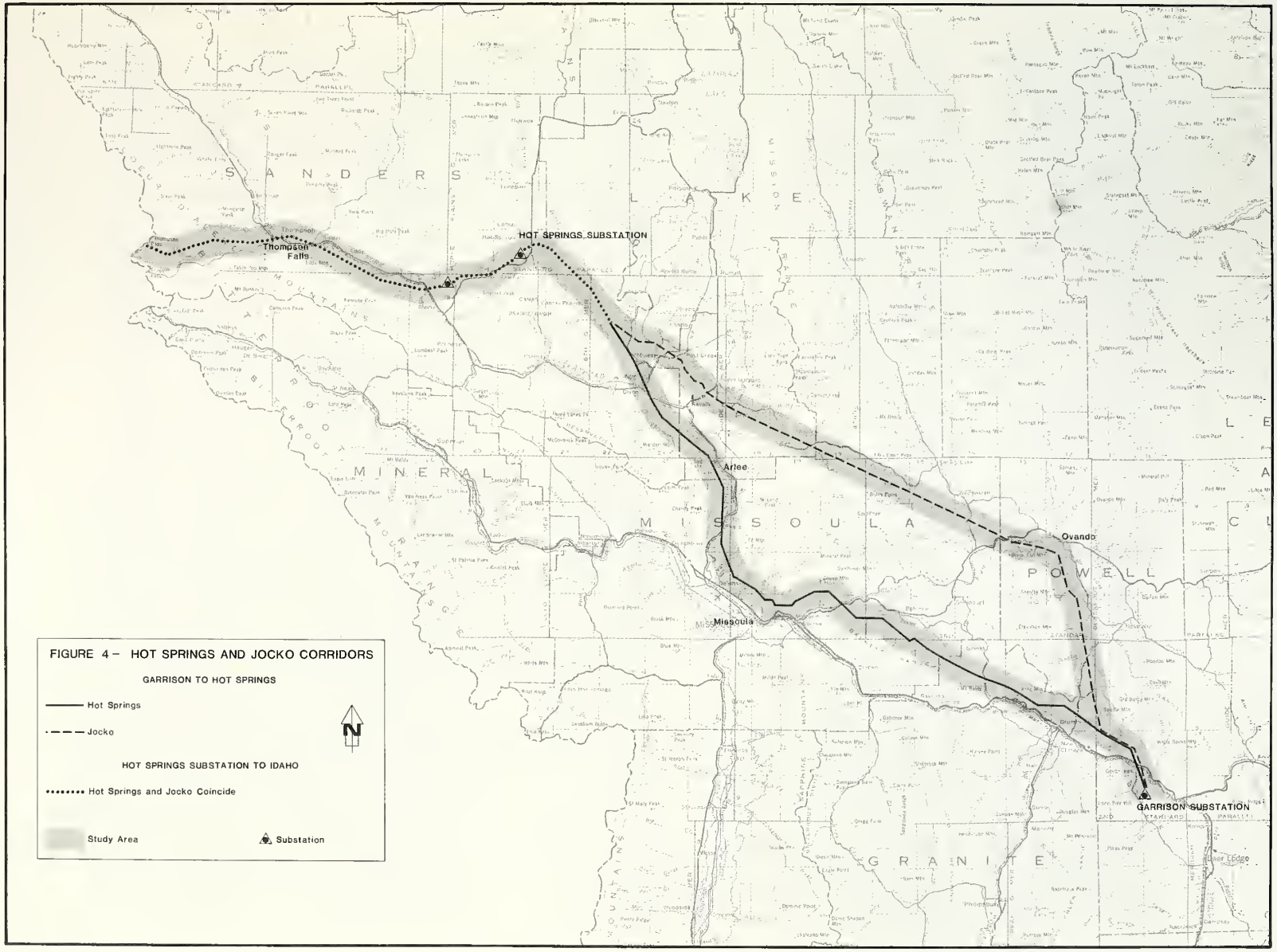
BPA'S ROUTE SELECTION PROCESS

The sixty-four segments BPA identified in its draft EIS were chosen to avoid or reduce impacts on people while avoiding western Montana's natural and man-made barriers. BPA used map overlays showing various environmental constraints to identify route segments. The Scapegoat, Bob Marshall, and Great Bear Wilderness Areas stand in the way of routes going northwest from Garrison and the Rattlesnake National Recreation area, Rattlesnake Wilderness, and City of Missoula limit alternatives going west from Garrison. The Selway-Bitterroot Wilderness area and several Rare II study areas lie south of Missoula and routes there would be long and circuitous.

The Clark Fork valley is developed as a utility and transportation corridor through the mountains in western Montana. BPA's sixty-four route segments follow this valley and a wide area south of it that is mostly free of man-made barriers. Routes going south of the Clark Fork cross difficult terrain at high elevations.

BPA selected routes by evaluating the potential impacts that could occur on each segment of the route and linking segments with the least potential impacts. BPA's system for finding a preferred route is summarized in Appendix A of the federal draft EIS. BPA's method was well designed and included an interdisciplinary team with representatives for each affected resource. However, the method was complex and difficult to follow because much of the selection process was not documented. After examining BPA's methods and findings, DNRC concluded that further analysis was necessary before it could decide if BPA's preferred Taft Route was the best. DNRC further concluded that it should use different criteria in evaluating routes. The differences between BPA and DNRC data and measurements of impacts are discussed in the next section of this chapter. General problems with BPA's draft EIS are discussed below.

The scale BPA used to map data was inadequate for DNRC to assess impacts on routes and route segments. Additionally, some essential data were not mapped by BPA. Although access roads could disturb more land than the transmission line right-of-way estimates of access road requirements for the segments were not used in evaluating impacts. Supplemental data including number and location of residences, information on recreation areas, wildlife habitat, cultural resources, and geology and soils were necessary for DNRC to evaluate BPA route segments. Comparable data also had to be gathered for the Jocko Route which was not studied by BPA.


HOT SPRINGS SUBSTATION
Thompson Falls
Arlee
Ovando
Missoula
GARRISON SUBSTATION
SANDERS
LAKE
MINERAL
MISSOULA
POWELL
GRANITE
FIGURE 4 – HOT SPRINGS AND JOCKO CORRIDORS
GARRISON TO HOT SPRINGS
Hot Springs
Jocko
HOT SPRINGS SUBSTATION TO IDAHO
Hot Springs and Jocko Coincide
Study Area
Substation
N

DESCRIPTION OF DNRC METHODS

Based on the BPA location factors, public comments, and MFSA requirements, DNRC identified nine types (see table 1) of social and natural resource impact categories that could be affected by transmission line construction and operation. DNRC resource specialists developed models to numerically quantify the impacts to each of these resources and called them siting concerns. These models are explained in working papers on file at DNRC. DNRC then devised a mathematical method to rank the importance of each siting concern and the magnitude and severity of impacts that could occur in each siting concern. While not any more objective than the methodology used by BPA, the DNRC method was more convenient because routes could be compared arithmetically.

DNRC did not consider the nine siting concerns to be of equal importance in locating the line. In a series of interdisciplinary meetings, DNRC decided that impacts to people and homes (as measured by the socioeconomics siting concern) and impacts to specially-managed areas (such as Wilderness Areas) should be the most important impacts to avoid in locating the line. A complete discussion of DNRC methods for quantifying impacts and comparing routes is on file at DNRC. Following is a brief summary of the differences between BPA and DNRC siting concerns.

SOCIOECONOMIC/AESTHETIC IMPACTS

BPA identified public concerns about the project. DNRC found no additional concerns and agreed with BPA's conclusion that much public opposition to the line has stemmed from concern about health, safety, and property values.

To measure the severity of impacts on people, BPA mapped urban areas, residential areas, farmland, and public land. DNRC thought that the most direct way to measure the severity of social and aesthetic impacts was to count the number of residences affected by the line, and measure the distance of each residence from the proposed powerline. DNRC used aerial photographs to determine how many residences lie within 2.0 mi of BPA's proposed centerline.

DNRC's analysis incorporated BPA data for measurements of the visual alteration of landscapes near homes. DNRC refined other viewer-related impact measures. BPA's measures of viewer sensitivity, the number of viewers, how close they would be to the line, and how long they can see it, as in the case of travelers passing nearby, were imprecise. BPA map scale did not accurately display potential impact areas, such as homes. DNRC identified two kinds of potential viewers, residential viewers and recreational viewers. The severity of visual impacts to residential viewers was measured by the distance of a home from the transmission line. The frequency of these visual impacts was measured by the number of residences affected. Recreational viewers are discussed in the Recreation section below.

There was a high degree of public concern about potential impacts from electrical fields and noise on people, livestock, honey production, and radio and television reception. BPA's analysis of these issues was not geared to define a zone of impact on either side of the transmission line. Because of this, DNRC commissioned studies on noise and biological effects to determine how close to people the line could safely be sited. DNRC's conclusions are discussed in the Electrical and Biological Effects section of chapter 5.

BPA and DNRC used similar methods for measuring nuisance to and interference with agricultural practices. BPA and DNRC used agricultural land use categories to measure impacts that a transmission line and access roads could have on agricultural operations with irrigated cropland experiencing the greatest adverse effects.

CONFLICT WITH SPECIALLY MANAGED AREAS

BPA mapped the specially managed areas crossed by the proposed routes, so DNRC needed additional information only on the Jocko Route. Specially managed areas along the Jocko Route include the Tribal Sacred area, the Blackfoot-Clearwater Game Range, and the National Bison Range. DNRC did not consider specially managed areas that could be avoided by locating the line inside the route studied but away from the centerline. Such areas include genetically superior timber stands and research areas.

RECREATION/AESTHETICS IMPACTS

BPA identified recreation resources and measured the aesthetic disruption a transmission line would cause in recreation settings. DNRC disagreed on the emphasis BPA gave to certain recreational resources and expanded BPA's list of recreation settings that could be visually or physically affected by the transmission line to include: wilderness areas, national trails and rivers, intensive use areas, roadless areas, scenic roads, high value fisheries, historic sites with interpretive or recreational potential, and dispersed recreational use on public or private lands.

The primary impact on recreation would be visual, so DNRC combined visual impacts with the recreation siting concern. Emphasis was assigned to each recreation setting to indicate the sensitivity of viewers to aesthetic impacts there, and the degree of conflict with recreation management objectives.

EFFECTS ON TERRESTRIAL ECOSYSTEMS

BPA's analysis of wildlife and vegetation impacts emphasized endangered species. DNRC thought more consideration should be given to habitat and security areas for big game species. The loss of big game habitat quality due to access road construction and maintenance was not adequately measured and several effective mitigating measures were not mentioned. DNRC measured the loss of habitat and predicted impacts on wildlife populations due to hunter use of access roads and listed supplementary mitigating measures to reduce the loss of big game habitat.

EFFECTS ON AQUATIC ECOSYSTEMS

BPA considered impacts to aquatic ecosystems to occur only where the line would cross high value fishery and perennial streams. The impact of access road construction and maintenance was not measured. To map erosion hazard as a supplement to BPA's analysis of impacts on aquatic habitats, DNRC used topographic maps and aerial photos, ground surveys, and Soil Conservation Service (SCS) soil data. Overlay maps of access roads and erosion hazard were applied to stream classification maps to determine erosion risk. DNRC's analysis estimates the risk of reduced fish populations because of increased sediment or the pollution of streams with herbicides.

CULTURAL RESOURCE IMPACTS

Some of the information needed to determine site density and site significance in relation to the anticipated impact of the powerline was not available in BPA's cultural resource overview or draft EIS, making it difficult to judge how known and predicted cultural resources were used in evaluating individual segments and the major routes.

TABLE 1. DNRC SITING CONCERNS AND IMPACT MEASUREMENT DATA

SITING CONCERN	DEFINITION OF CONCERN	ITEMS USED TO MEASURE CONCERN
Socioeconomic/Aesthetic Impacts	Decrease in quality of life, specifically decline of aesthetic quality; real or perceived effects on property values; health and safety; noise: radio and television interference; and interference with agricultural practices.	Number of residences in a corridor and distances of residences from centerline. Landscape variable: degree visual alteration, Type of agricultural land crossed including irrigated cropland, nonirrigated cropland, and rangeland, and average farm unit size by county.
Conflict with Specially Managed Areas	Conflict with areas set aside by a governing body for special management for public use and/or areas where legal restrictions make crossing of an area by a transmission line difficult.	Miles of an area or number of sites crossed by a segment or route in each of the following categories: Tribal or federal wilderness areas; Tribal Sacred Area; game management areas or ranges; wild and scenic rivers; municipal watersheds; special zoning or other legally restricted areas: and aerodromes.
Recreation /Aesthetic Impacts	Decrease in aesthetic quality of a recreation site or setting.	Length of route or segment crossing or adjacent the following recreation sites or areas: Wilderness, Primitive, or National recreation areas; intensive recreational areas and sites: National/State recreational trails or rivers; roadless areas as defined by Rare II; dispersed recreational use areas on private and public lands; high value fisheries (DFWP stream classifications); scenic roads, and historic sites having recreational value. Aesthetic quality measurements included: viewer sensitivity (measured by giving high value to recreational settings where visual quality is important); viewer exposure to count number of people who would see the line (measured with BPA data); and visual alteration (the change in the landscape due to the transmission line).
Effects on Terrestrial Ecosystems	Reduction in carrying capacity of terrestrial habitats for species of concern in Montana.	Length of segment or route crossing the following habitats: deer, elk and bighorn sheep winter, summer, and highly secure habitat; or riparian cottonwood communities; or bird wire strike zones; or rare, endangered, or threatened species habitat (e.g., grizzly bear and Howell's gumweed). Number of each of the following sites affected by each segment or route: heron colonies, eagle, osprey, or other nests, rookeries or eyries. Acreage on each segment or route affected by high, medium, or low access requirements in each of the following categories: big game security areas, endangered species habitat, deer, elk, and bighorn sheep winter and summer range.

TABLE 1 (cont.)

SITING CONCERN	DEFINITION OF CONCERN	ITEMS USED TO MEASURE CONCERN
Effects on Aquatic Ecosystems	Reduction in the carrying capacity of aquatic habitats for species of concern in Montana.	The number of streams in each DFWP Class I, II, III, and IV fishery categories crossed by each segment or route -- 12 measures. The length of Class I, II, III, and IV streams falling into high (>30%), moderate (16-30%), or low(<16%) erosion risk categories--12 classes. The number and miles of proposed access roads crossing Class I, II, III, and IV streams which fall into high, moderate, or low erosion potential classes.
Cultural Resource Impacts	Any damage to or deterioration of historic or archaeological sites due to construction or operation of the transmission line and access roads.	Known historic and prehistoric sites; and areas of predicted high or low impacts (based on landforms such as river valleys, saddles, and benches--areas where historic human habitation or activity occurred) crossed by the ROW. New access road requirements.
Land Productivity Impacts	Reduction in the area or ability of land to produce commodities such as grain, timber, or cattle.	Miles of segment or route which traverses each of the following categories: dry cropland; prime farmland as defined by SCS; farmland of statewide importance; irrigated land; forest land in high, medium, and low productivity classes as defined by USFS; high, medium, and low access road requirements in forested areas.
Residential Land Development Impacts	A change in an existing or projected use of land for residential development.	Measurements of unsubdivided and subdivided land and projection of residential development based on growth rates and patterns 1960-1980.
Construction Constraints	Existing natural conditions that restrict line construction and increase construction cost.	Length of segment or route crossing problem soils based on SCS information and on-the-ground reconnaissance. Length of right-of-way traversing moderate (16-30%) and high (>30%) slope categories.
Cost of Construction	Costs for constructing the transmission line and access roads.	Based on typical segment cost information supplied by BPA.

To supplement BPA's data, the Montana State Historic Preservation Office (SHPO) and BPA's cultural resource consultant jointly developed a method to predict probable site locations in portions of the study area lacking sufficient site and/or survey information. SHPO compiled a list of all known historical and archaeological sites in the study area and mapped them. SHPO and the BPA consultant then examined landforms and other data to predict where undocumented cultural properties were likely to be found. New access road construction increases the risk that cultural resources will be damaged or destroyed, so new access road requirements were factored into the prediction.

LAND PRODUCTIVITY IMPACTS

BPA used two measures of land productivity. One measured agricultural impacts and the other measured losses in timber production. DNRC measured forest, crop, and range productivity. BPA data were used and supplemented by DNRC data on the Jocko Route and in the Ovando-St. Ignatius, Maxville-Drummond, and Missoula-Miller Creek areas.

CONSTRUCTION CONSTRAINTS

BPA's geology and soils information was mapped at too small a scale to allow assessment of construction limitations. DNRC created slope maps from USGS topographic maps at a scale of at least 1:62,500. Slope maps helped define areas of potential construction and maintenance difficulties, and erosion risk. BPA's problem soils maps were supplemented with SCS data not available at the time of BPA's study. DNRC developed additional data through ground reconnaissance for areas not covered by SCS data. DNRC identified landslide areas along routes and believes that centerline selection should include studies to avoid landslide problems with access roads.

RESIDENTIAL LAND DEVELOPMENT IMPACTS

BPA mapped subdivided land to measure the possible effects of the transmission line on residential land development. BPA's assessment of impacts on subdivided land was limited to land crossed by the 125-ft right-of-way, and assumed that there would be no effects on residential development outside the right-of-way. DNRC used BPA's data, adding local information on subdivided land and trends in population growth to predict future residential land uses. Subdivided land and land in high growth areas likely to be developed for residential use was identified.

DNRC assumed impacts could occur to residential land development up to 1.0 mi from the proposed centerline because of the expected high visual impact of the transmission line. The 1.0-mi zone may be overly cautious: in Missoula, residents have built adjacent to the existing 230-kV line and in other parts of the country people have built next to 500-kV transmission lines. DNRC's impact zone reflects the objections expressed by people to having the line near them.

COST

BPA estimated construction and acquisition costs for access roads, tower steel, tower erection, and land acquisition, based on typical construction costs for similar projects. BPA also made an allowance for the extra expense of building in mountain terrain. DNRC disagreed that land acquisition and other expenses should be used in comparing segments and felt that costs should be used only to compare whole routes, not route segments. DNRC obtained construction and material cost estimates from BPA based on 1982 dollars without overhead and adjusted for inflation. DNRC used these figures to estimate the cost of each of the routes. Neither BPA nor DNRC considered the cost of mitigating measures in estimating construction costs.

CHAPTER 3
SYSTEM PERFORMANCE AND RELIABILITY

BPA's transmission system from Garrison to the Idaho border would increase the capacity of Montana's transmission network so power from Colstrip 3 and 4 could be carried to the Pacific Northwest 500-kV grid, which now extends as far east as Hot Springs. This chapter examines the purposes of the proposed line.

INTERCONNECTED SYSTEMS

Montana is electrically connected with the power systems of adjoining states. The interconnected system consists of areas of electrical demand (load centers) connected to generators by a network of transmission lines. Utilities build interconnections with neighboring utilities to allow interchange of electricity owned by different utilities to meet electrical demand. Interconnections also permit power to be exchanged when plants are shut down for maintenance, or when hydroelectric facilities cannot generate sufficient power because of low water levels.

Most power in the Pacific Northwest is generated at large dams. Water levels fluctuate seasonally, and flows tend to be lower in the summer when demand for power is greatest on the west coast. If the Pacific Northwest were to experience several years of drought, water levels would be low and less electricity could be produced. The Pacific Northwest would require supplemental power generated elsewhere during these low-water periods. Maximum power flows from Montana to the west would occur when loads were light in Montana (resulting in a power surplus in the state) and when water was low in the Pacific Northwest.

Seventy percent of Colstrip 3 and 4 generating capacity is owned by utilities in Washington and Oregon with thirty percent owned by MPC. Construction of 500-kV lines from Colstrip to the Garrison substation, where it would connect with existing 230-kV lines owned by BPA and MPC, would provide a new link between Colstrip and the transmission grid in western Montana. Power from Colstrip will flow west to Townsend over the 500-kV lines being built by MPC, from Townsend to the Garrison substation over a new BPA 500-kV line. Existing MPC and BPA 230-kV lines will connect to the Garrison substation. Figure 5 displays how the existing 230-kV transmission lines will loop into the Garrison substation. This loop will reinforce the power supply system in western Montana.

BPA's proposed 500-kV transmission lines from Garrison west would transport power to a substation near the Idaho border, as discussed in chapter one.

In interconnected systems, a component failure in one area can affect the performance of equipment in far away portions of the system. An example of this is the 1965 blackout in New York City, which resulted from the failure of a single relay in Canada. Following this blackout, regional reliability councils were established and made responsible for developing interconnected systems performance standards. WSCC is responsible for the western United States and has established dynamic performance criteria for two system conditions: (1) normal conditions, and (2) one transmission line out.

For example, WSCC criteria do not permit the interruption of electrical service if one major transmission line is out of service. This means there must be enough redundancy in the network to serve all loads even if one line goes out. If two lines go out simultaneously, the criteria permit the dropping of interruptible loads but not firm loads. A service area can be isolated to prevent failures from causing other failures (cascading failures) only if three lines are out of service.

FIGURE 5. DIAGRAM OF TRANSMISSION LINES FORMING A LOOP TO TIE THE 230-kV SYSTEM AT THE GARRISON SUBSTATION

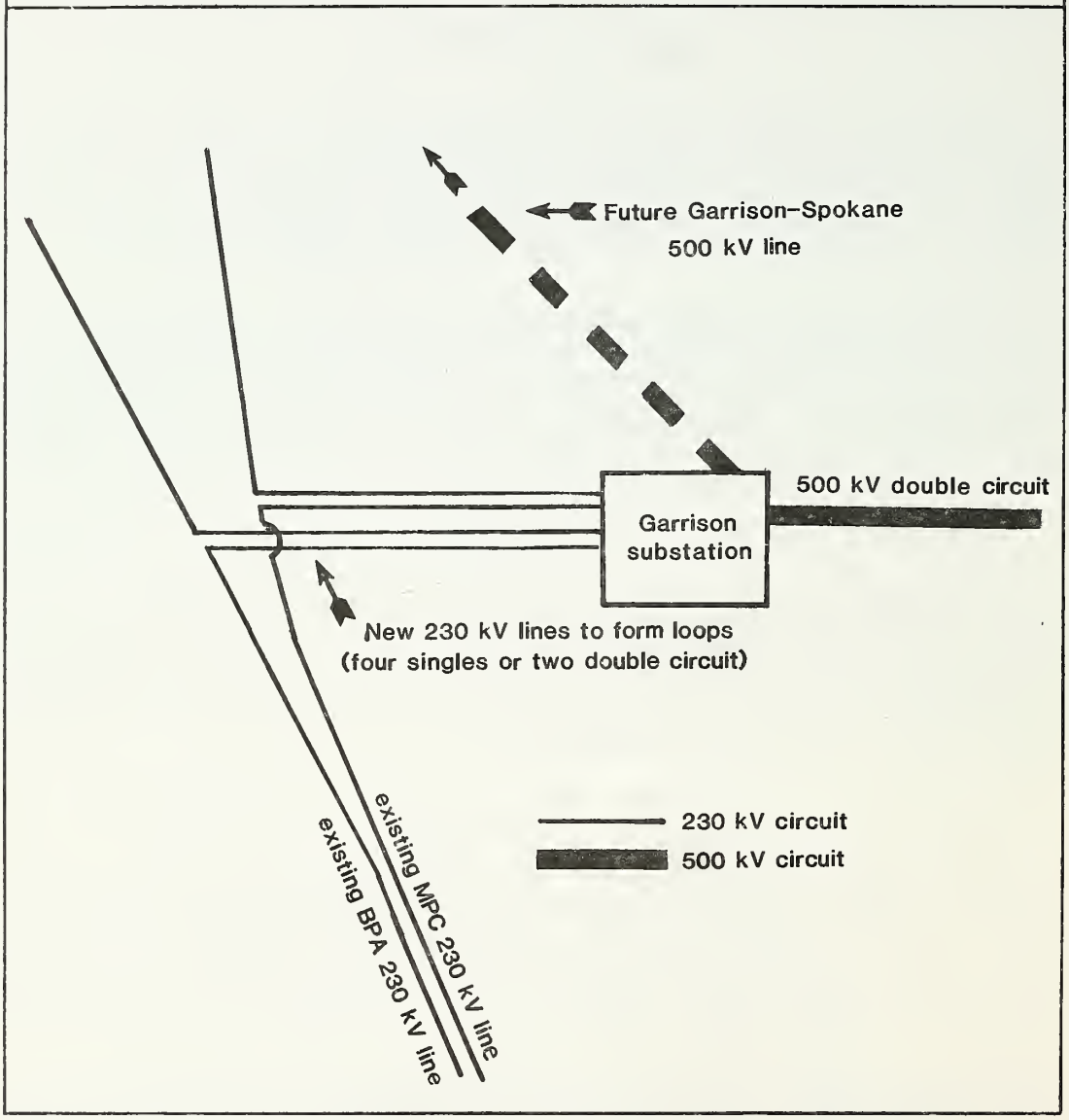


TABLE 2. WINTER PEAK LOAD CONDITIONS PROJECTED FOR JANUARY 1986

(HEAVIER POWER FLOWS ARE PROJECTED FOR LOW-WATER LIGHT-LOAD CONDITIONS)

		No 500-kV lines between Garrison and Hot Springs					Two 500-kV lines between Garrison and Hot Springs
		System Normal	Garrison to Ovando 230-kV line out	Ovando to Hot Springs 230-kV line out	Garrison to Rattlesnake 230-kV line out	One Garrison to Anaconda 230-kV line out	
Thermal Rating (MVA)	Power Flows (MW)						
358	Garrison to Rattlesnake	211	252	266	---	238	93
358	Rattlesnake to Hot Springs	26	68	87	-71	23	-110
474	Garrison to Ovando	138	---	30	206	168	15
474	Ovando to Hot Springs	128	44	---	199	138	-14
832	Garrison to Anaconda*	572	624	616	687	overload (490)**	469

Note: Negative sign indicates power flow is in the opposite direction.

* Two 230-kV transmission lines connect Garrison to Anaconda with ratings of 358 MVA and 474 MVA yielding a combined thermal rating of 832 MVA.

** Overload condition is projected for loss of the 230-kV line with a thermal rating of 474 MVA.

TABLE 3. WINTER PEAK LOAD CONDITIONS PROJECTED FOR JANUARY 1987

(HEAVIER FLOWS ARE PROJECTED FOR LOW-WATER LIGHT-LOAD CONDITIONS)

		No 500-kV lines between Garrison and Hot Springs					Two 500-kV lines between Garrison and Hot Springs
		System Normal	Garrison to Ovando 230-kV line out	Ovando to Hot Springs 230-kV line out	Garrison to Rattlesnake 230-kV line out	One Garrison to Anaconda 230-kV line out	
Thermal Rating (MVA)	Power Flows (MW)						
358	Garrison to Rattlesnake	269	328	343	---	286	103
358	Rattlesnake to Hot Springs	70	129	152	-51	67	-104
474	Garrison to Ovando	200	---	49	289	220	34
474	Ovando to Hot Springs	176	53	---	267	188	-12
832	Garrison to Anaconda*	685	660	640	730	overload (499)**	416

Note: Negative sign indicates power flow is in the opposite direction.

* Two 230-kV transmission lines connect Garrison to Anaconda with ratings of 358 MVA and 474 MVA yielding a combined thermal rating of 832 MVA.

** Overload condition is projected for loss of the 230-kV line with a thermal rating of 474 MVA.

Other requirements for system performance relate to conditions when the generators are operating at their normal speed and supplying electrical demand. The transmission system should be able to transport electricity without overloading any component of the transmission system and without reducing voltage levels. BPA designs its facilities to maintain a system voltage level 95 percent of normal when any transmitting component, such as a transmission line, is out of service.

SYSTEM PERFORMANCE

BPA projections of power flows show that with low-water in the northwest and light load in Montana in 1985 the Pacific Northwest power system would require 1,716 MW of electricity from Montana. That same year, the Western Area Power Administration has scheduled the flow of an additional 200 MW from North Dakota through the Pacific Northwest power grid to California. The capacity of a transmission line to carry power is called a thermal rating and expressed in megavoltamperes (MVA). One MVA is equivalent to about 0.95 MW. The MPC 230-kV line from Garrison to Hot Springs via Ovando has a thermal rating of 474 MVA and the older BPA 230-kV line to Hot Springs via Missoula is rated at 358 MVA. The 832 MVA thermal rating of the existing transmission system means it could carry only about 800 MW, far below the projected 1985 maximum demand of 1,916 MW.

DNRC examined the performance of three alternative routes for the proposed 500-kV line (Garrison-Hot Springs-Bell, Garrison-Plains-Bell, and Garrison-Taft-Bell) under different outage conditions. The three alternatives performed similarly and adequately under all outages modeled.

Tables 2 and 3 project the power flows for January 1986 and 1987 under normal conditions and with an outage, and under two assumptions: (1) that a line is built from Garrison to Hot Springs, and (2) that the line is not built.

Under system normal conditions, the Garrison-Rattlesnake-Hot Springs 230-kV line would carry 211 MW in 1986. An outage on the Ovando-Hot Springs 230-kV line in 1986 would increase the power flow on the Garrison-Rattlesnake 230-kV line to 266 MW. The January peak loads are well below those projected to occur in low-water light-load conditions. Assuming a growth in the load flow of 58 MW the next year, as predicted by BPA, a similar outage on the Ovando-Hot Springs line in 1987 would raise current in the Garrison-Rattlesnake line from 269 MW to 343 MW. The Garrison-Rattlesnake 230-kV line has a thermal rating of 358 MW, and assuming growth in load flow as projected by BPA, an outage on the Ovando-Hot Springs line in 1988 would probably cause line capacity of the Garrison-Rattlesnake line to be exceeded. In the case of the two Garrison to Anaconda 230-kV lines, a loss of one would cause the other to exceed its capacity in either 1986 or 1987. With the 500-kV line in place, loss of any 230-kV line would not cause an overload on any other.

Line losses are high when transmission lines approach or exceed their thermal rating and convert the excess electricity to heat. The added capacity provided by the 500-kV line would drop the amount of power carried on MPC's existing system, reducing projected line losses in 1986 from 80.9 MW to 66.6 MW. The 1987 losses are expected to be 93.4 MW without the proposed line, or 67.7 with the line in operation.

CHAPTER 4
TRANSMISSION LINE CONSTRUCTION

Construction of the Montana portion of the Garrison-Spokane 500-kV transmission line is scheduled to begin in May 1983 and should be complete to Taft, Plains, or the Hot Springs substation by October 1985. The segment from the substation to the Idaho border is scheduled for completion a year later. Construction will take place mainly during the summer months. The steps used in constructing and maintaining the 500-kV line are discussed below.

PREPARATION FOR CONSTRUCTION

The first step in transmission line construction is survey of the right-of-way to determine the tower locations (centerline). In forested areas this involves brush and tree cutting and staking the line. Temporary field offices and staging areas are also established. The staging areas are used to store construction materials and equipment.

After centerline survey, trees are removed from the right-of-way. At least 36 ft of line clearance is maintained to prevent grounded objects, such as trees, from being struck by an electrical arc from the transmission line. Trees that could fall on or within flashover distance of the line in eight years, are also removed. Table 4 shows the approximate amount of tree clearing required for a 500-kV line.

BPA divides clearings into: Class A and Class B. Class A calls for the cleanup of all debris except tree stumps from the right-of-way, and is used in cultivated lands, parks, and residential areas. Class B clearing involves removing timber and large debris and leaving stumps and small limbs. Class B clearing is used on most forest lands (BPA 1977). Table 5 defines each class of disposal. In timbered areas, marketable timber will be sold and slash will be piled and burned if DHES grants a permit to do so. On the Townsend to Garrison portion of the line non-marketable timber was left near access roads with the hope that it would be used as firewood.

CONSTRUCTION ACTIVITIES

New roads are built and existing roads are upgraded in this phase of construction. Photograph 1 shows a permanent access road constructed by BPA on moderately steep slopes. Temporary access roads are used for tree clearing and stringing and tensioning conductors. In flatlands, access roads could be temporary and the disturbed land could be reseeded. Permanent access roads are built to each substation and each tower site. On steep terrain, road building requires large cut and fill operations, and up to 4.0 mi of access road may be required for 1.0 mi of line. Access roads to tower sites are allowed to have grades of up to 20 percent, but most roads will have grades of less than 15 percent. BPA wants permanent access roads to each tower site to aid in maintenance activities.

Two types of steel lattice towers will be used, standard suspension towers, and dead-end towers. Towers are designed to hold conductors above the ground and maintain a minimum clearance between conductors. Standard suspension towers are 165 to 175 ft tall, spaced at 1,100 ft intervals, and are made of lighter gauge steel than dead-end towers (see photograph 2).

Dead-end towers are used where the line turns a corner or for long spans. Dead-end towers are made of heavier steel, require larger footing excavations, and have larger base dimensions than suspension towers. One dead-end tower would normally be used every 2.0 to 4.0 mi of transmission line depending on terrain (see photograph 2) and at each angle turned by the line.

TABLE 4. APPROXIMATE ACREAGE OF TREE CLEARING REQUIRED FOR TYPICAL BPA TRANSMISSION LINES

(Acres of Timber/Mi)*

Timber Classification	Avg. Ht. of Trees (in ft.)	Clearing Required (acres of timber/ mile) for a 500-kV transmission line
Douglas-Fir	50	20
	100	38
	150	44
Ponderosa Pine	50	18
	100	32
	150	42
Lodgepole Pine	50	16
	100	32

Source: BPA 1977.

TABLE 5. WASTE MATERIAL DISPOSAL

General Disposal Items	Class of Disposal Class A	Class B
Waste created by the Contractor: See Note (a)	Utilize, burn or remove	Same as A
Existing line survey waste material	Utilize, burn or remove	Same as A
Buildings & building debris	Remove	Same as A
Occasional tops, limbs & brush, under 3 in diameter & 3 ft long	Utilize, burn or remove	May be left
Existing waste material	See Note (b)	May be left, moved or burned

Notes:

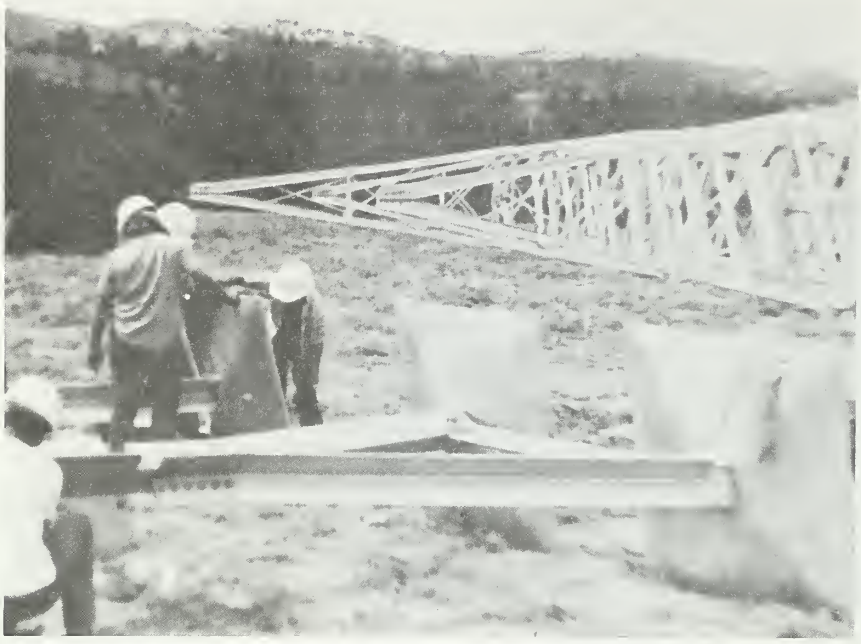
(a) Including snags felled within 200 ft of a burning area.

(b) Utilize, burn, or remove existing material over 6 inches in diameter and 8 ft in length.

Source: BPA 1978.

PHOTOGRAPH 1. ACCESS ROAD ON MODERATE SLOPES NEAR ELKHORN, TOWER LEGS ARE ASSEMBLED.

PHOTOGRAPH 2. BPA'S DOUBLE-CIRCUIT 500-kV SUSPENSION TOWER (LEFT) AND DEAD-END TOWER (RIGHT) SOUTH OF TOWNSEND, CONDUCTORS ARE NOT YET STRUNG.



PHOTOGRAPH 3. ASSEMBLY OF A PRESSED PLATE FOOTING NEAR ELKHORN.

PHOTOGRAPH 4. ASSEMBLED GRILLAGE FOOTING FOR A DEAD-END TOWER. ABOUT 250 CUBIC YARDS OF MATERIAL MUST BE EXCAVATED FOR THE FOOTING.

The type of footing used depends on the substrate materials at the tower site. Grouted footings are installed in bedrock. Excavation for grouted footings is done by boring or blasting. Pressed plate and grillage footings, shown in photographs 3 and 4, are used in unconsolidated materials. Footings require excavation for each leg of the tower and excavations for dead-end towers using grillage footings may require removal of up to 250 cubic yards of material.

A test hole is bored to determine what type of footing should be used at a site, then the footing holes are bored, or drilled and blasted and/or excavated with a backhoe. The grouted footings are placed in the hole and supported with concrete. Concrete may be delivered to the site by truck or the site could have a temporary concrete batch plant. The remaining hole is backfilled with dirt.

Grillage and pressed plate footings are placed in the excavated holes and backfilled. If 90 to 100 inches per cubic foot of density is not achieved by backfilling the hole with the excavated material, select backfill is hauled to the site. Grillage and pressed plate footings do not require concrete.

A flat area at the site of each tower is required for assembly and erection of towers. In steep terrain these areas will require excavation. Portions of the tower are assembled on the ground, then lifted into place with a crane, and bolted to the standing portion. This is shown in photograph 5. Helicopters can be used instead of cranes to assemble towers, but BPA does not plan to do this in Montana. Most towers on the transmission line in Montana would require grounding through counterpoise wires. Tower grounding prevents damage to the towers and line from lightning strikes. Installation of counterpoise wires may require ground disturbance outside the right-of-way, and BPA would compensate the landowner for such disturbance.

After assembling and placing the towers, conductors are strung and tensioned according to project specifications. Specially designed trucks or trailers transport the conductor reels to the stringing site and are aligned with the tensioning machine. Stringing sites generally occur at intervals of 1.8 to 3.7 mi (Ferguson 1982) and an area of land 0.6 acres or more per site can be disturbed during this operation.

When the conductor trucks are in place next to a dead-end tower, a nylon rope called a sock line is strung through pulleys called stringing sheaves, which are attached to the arms of each tower. The sock line is pulled by a helicopter to the next dead-end tower, where the line is attached to a steel cable. A winch is used to pull this cable back through the stringing sheaves to the conductor truck, where it is attached to the end of a conductor, which is then winched back through the stringing sheaves. When the conductor has been strung from dead-end tower to dead-end tower, it is attached at the far end to a connector called a "dead-end assembly," which is suspended from an insulator string.

After the end of the conductor is secure in the dead-end assembly, a winch on the other end tightens the line to the proper tension. When proper tension (sag) is achieved, the conductor is attached to another dead-end assembly and cut, after which the tension is maintained between the two dead-end towers. The conductors are free to move through the pulleys attaching them to the suspension towers between the dead-end towers. Each successive conductor section is attached to the next through dead-end assemblies.

Pulling and tensioning machines could be placed outside the right-of-way boundaries while stringing some angle towers. The extra area would be needed so that the conductor reels, tensioning machine, and the pulling machine could be arranged in a straight line several hundred feet from, and aligned with, the towers being strung.

POST-CONSTRUCTION ACTIVITIES

During cleanup and restoration, the land at tower bases is returned to the original contour and seeded. Road surfaces will not be reseeded and water bars and other erosion control devices will remain in place. Cropland compacted by construction equipment can be loosened by subsoiling (deep plowing with special equipment).

BPA policy requires permanent access roads so that each tower can be reached with a four-wheel-drive vehicle. From four to eight times a year, BPA will inspect the transmission line by helicopter. Electrical equipment, towers, substations, and access roads will be repaired as necessary.

PHOTOGRAPH 5. MPC SINGLE-CIRCUIT 500-kV TRANSMISSION TOWER BEING ASSEMBLED SOUTH OF TOWNSEND.

CHAPTER 5
ENVIRONMENTAL, SOCIAL, AND ECONOMIC CONCERNS

BPA's draft EIS describes the potential impacts of the construction and operation of the 500-kV transmission line. In this chapter, impacts are described under each siting concern to supplement BPA data to fulfill the MFSA requirement for a statement of the nature of probable environmental impacts (both adverse and beneficial) that could be expected as a result of construction and operation of the proposed transmission line. Additional information gathered by DNRC to assess the magnitude of these impacts is discussed in this chapter and measures that could reduce the severity of potential impacts are listed. Specific resources that could be affected on each route are discussed in chapter 6.

SOCIOECONOMIC/AESTHETIC EFFECTS

DNRC agreed with BPA that given the high level of public concern about the effects of this project on people that the transmission line should be sited away from homes to the greatest extent possible. DNRC measured the possible effects on people more precisely than BPA, by mapping from air photos residences along the proposed routes.

PUBLIC COMMENT

Interviews conducted by BPA and testimony at public meetings held in western Montana indicate strong opposition to construction and operation of the proposed transmission line. Montanans questioned the need for the electricity transmitted by the line and were concerned about the transmission project's effects on the quality of life. People were critical of development of the project by a tax-exempt federal agency. Comments reflected feelings of resentment and frustration over the perceived inability of Montanans to influence the decision to build the transmission line.

Need for the project was questioned because projections of future electrical demand in the BPA service area have been lowered. Even if a clear demand for the electricity were demonstrated, some Montanans would remain opposed to this project because Montana would suffer environmental impacts while primarily serving out-of-state electrical needs.

The proposed transmission line from Garrison to the Montana-Idaho border would be a dominant and visually intrusive element on the landscape. Massive towers, with an average height of 165-175 feet, conductors, access roads, and right-of-way clearing would cause direct and long-term visual impacts. Public concern has focused on impacts to residential areas and recreation settings. The transmission line would conflict with values and lifestyles in western Montana and would be a major visual intrusion in recreational settings, conflicting sharply with viewer expectations for natural environments and high scenic quality.

Comments also demonstrated apprehension about possible adverse effects of high voltage electrical fields on human health and safety and about the lack of conclusive research that demonstrates the safety of electrical fields.

Property owners near the line are concerned about the effects of the project on property values. A lowering of property values could result from visual degradation of the landscape, the possibility of adverse effects on health and possible interference with television and radio reception. BPA says it will restore television and radio reception to previous quality.

Public officials expressed disappointment over local tax revenues foregone due to public rather than private ownership of the project. BPA, a federal agency, would not pay property taxes. Revenues that would have been paid ($68 to $103 million, depending on the route) if the project were built by a private utility, are discussed in BPA's draft EIS and Appendix D of that document.

Farmers and ranchers said that transmission towers and lines could interfere with agricultural operations, increasing time and expense in farming. Of particular concern were disruptive effects on mechanical irrigation system use, and the danger of shocks. They also expressed apprehension about possible biological effects on livestock. The transmission project is seen by many Montanans as incompatible with lifestyles and people who oppose the project feel their opinions have been unheeded.

Because of these concerns, many people at the hearings advocated placing the transmission line on public land, and avoiding private land. People said that although this would increase impacts to wildlife and the environment, avoiding people was more important. In St. Regis however, outfitters who use public land were concerned about a possible loss of income due to the presence of the transmission line.

The issue of paralleling existing corridors was also raised. The presence of large towers, conductors, right-of-way clearing, and access roads all combine to create long-term impacts. Additional impacts are caused by silhouetting or sky-lining of towers along ridgetops and mismatching of tower size, shape, or configuration, when two or more lines run parallel (BPA 1982).

ADDITIONAL INFORMATION

SHORT-TERM CONSTRUCTION EFFECTS ON LOCAL COMMUNITIES

Construction of the transmission line will create short-term employment. BPA expects 75 percent of the clearing crews to be hired locally, but most of the skilled workers for tower construction and stringing will come from out of state. Local purchases of equipment or materials by contractors would increase local income. Worker expenditures on food, lodging, and entertainment would have a beneficial effect on local businesses. Payroll to Montanans and non-local workers would total about $17.5 million and the workers would be liable for personal income tax to the state. BPA does not anticipate that construction workers would significantly affect community services. DNRC concurs based on the use of community services in Boulder, Deer Lodge, and Townsend during construction of the Townsend to Garrison portion of the line.

DNRC researched the construction period impacts of the Townsend-Garrison portion of the line. DNRC called the Chamber of Commerce, banks, tourist establishments, county commissioners, the sheriff and police, affected landowners, and BPA.

In compliance with the Board's recommendation, BPA's construction field representative and BPA contractors met with county commissioners in Powell and Jefferson counties, and with county extension agents and USFS representatives in Broadwater County, to explain where construction would take place and what to expect during construction. BPA said that the meetings were valuable and that similar meetings would be worthwhile on the segment from Garrison west.

In Deer Lodge and Boulder construction of the line increased the volume of business for food, lodging, and entertainment establishments. Where housing for construction workers was not sufficient in towns nearest the work site, usually workers found housing in the next nearest town. For example, Deer Lodge had substantial vacancies, but these became filled and workers then found housing in Anaconda.

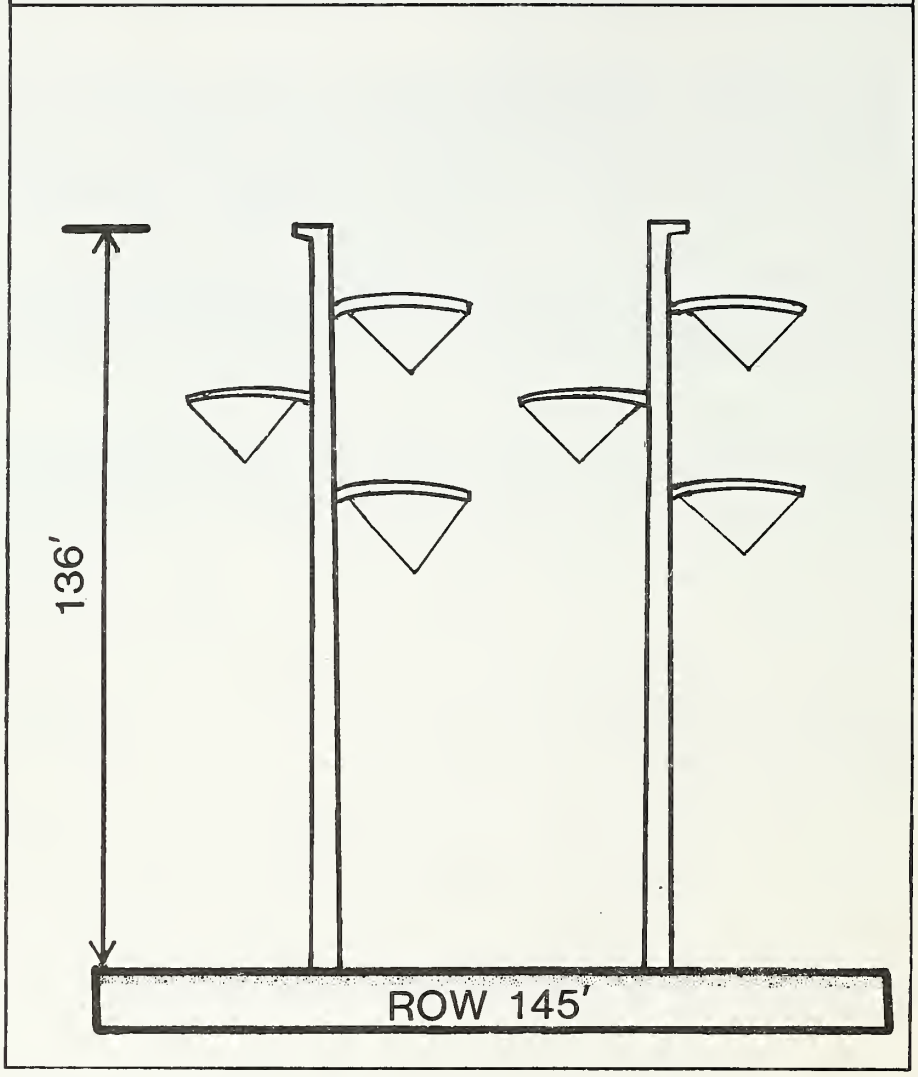
The only identified increased demand on public services was for sheriff and police services. The Broadwater County sheriff reported extra work patrolling BPA's construction sites. The Boulder police reported increased arrests for drunk and disorderly conduct, fighting, and vandalism as a result of construction workers in the area. Boulder did not hire additional peace officers. BPA reimburses local governments only for services provided in response to its request, not for services indirectly attributable to construction and maintenance of the transmission line. Therefore, BPA did not reimburse the Boulder police since the increase in work stemmed from the increase in population, not from a direct service to the transmission line. BPA contracted with the Jefferson County Sheriff to provide protective services for the line, and BPA anticipated that the Jefferson County contract would indirectly benefit the Boulder police. In Deer Lodge, BPA contracted with the Powell County Sheriff to prevent vandalism at the Garrison substation site.

Easement negotiations with landowners were sometimes not resolved, which caused landowner concern about whether they would receive fair compensation. Complaints about abuse of easement privileges included gates left open, delays in replacement of cattleguards, cut fences that were not cross-braced, and equipment operating outside access road and right-of-way boundaries. Landowners had difficulty resolving these problems because BPA did not have a field liaison to handle complaints and make sure problems were corrected. The traffic to and from the Garrison substation was greater than expected by landowners who compared it to major highway traffic. Residents said that opposition to the line lingered but that vocal public opposition had quieted.

More Montanans were employed on the Townsend-Garrison segment of the transmission line than BPA expected. BPA thought Montanans would get 75 percent of the clearing jobs but none or few of the skilled jobs in tower construction and stringing. However, on MPC transmission line construction from Colstrip to Townsend, 50 to 95 percent of the workers were dispatched from Montana union locals. On the Townsend-Garrison segment peak employment figures show that 590 out of 790 workers, or 75 percent of the work force was hired from local sources (Ferguson 1983). Two sections of the line were built by non-union contractors who brought more of their own workers, especially skilled workers, with them. One contractor hired 76 percent of the crew locally; the other 26 percent. The third section of the line and the substation were built by union contractors. These firms brought supervisors with them but hired predominantly from local union halls, including skilled workers. The substation contractor hired 75 percent of the work force locally and the third contractor hired 90 percent of the crew locally.

Based on this, DNRC expects that if BPA hires union contractors that a minimum of 75 percent of the jobs on the Garrison-West project will be filled locally. Fewer Montanans and fewer skilled workers will be employed if the contractor is non-union. BPA states that it cannot discriminate between union and non-union contractors in bid-letting, but it will encourage the selected contractors to hire local people.

FIGURE 6. DIAGRAM OF IMPROVED APPEARANCE TOWERS.



REDUCTION OF IMPACTS

Impacts to landowners can be reduced in three ways: (1) locating the line to avoid interference with agricultural equipment, (2) locating towers and access roads to reduce visibility of the line from homes, and (3) responding promptly to landowner complaints during construction.

Centerline adjustments could be used to reduce visual impacts, particularly near residences and recreation settings.

Tower darkening may be an effective measure for reducing visual impacts for the entire Montana portion of the line. BPA has proposed darkening for portions of the route but not all of it, and use of improved-appearance towers (see figure 6) in selected areas would reduce visual impact of the line.

In certain areas where public opposition to the proposed centerline still exists, it may reduce impacts if a cooperative effort is undertaken in which federal and state representatives and local citizens work together to find an acceptable centerline location.

Impacts to local governments and communities could be reduced if BPA representatives stay in close touch with local officials through the construction period. Meetings and coordination of action by BPA with local people could help resolve problems and reduce impacts. The Board's previous recommendation that BPA and its contractors meet with local officials and service providers prior to construction worked well and could be adopted again for this phase of the project. Impact aid for indirect services such as those provided by city police would ensure that local governments are not burdened with increased costs resulting from powerline construction.

If BPA contractors hire local workers, the economic benefits to Montanans would increase and community impacts from an influx of construction workers would be less. BPA cannot select contractors on the basis of whether they are union or non-union. BPA could encourage its contractors to hire as many local workers as possible.

CONFLICT WITH SPECIALLY MANAGED AREAS

Specially managed areas are established by local, state, federal, or tribal governments and managed for specific purposes. The proposed transmission line could conflict with management objectives for these lands and crossing them would require the consent of a governing body.

BPA discussed specially managed areas in the draft EIS. DNRC agrees with BPA's analysis of impacts to specially managed areas but required more information on specially managed areas in Montana, especially on the Jocko route. Table 6 lists specially managed areas which could be affected by the the transmission line, and the agencies responsible for them. More information on the characteristics of some of these areas is given in the Recreation section. Conflicts with these specially managed areas can best be avoided by siting the transmission line outside their boundaries.

TABLE 6. SPECIALLY MANAGED AREAS CROSSED BY THE PLAINS, TAFT, HOT SPRINGS AND JOCKO ROUTES

SPECIALLY MANAGED AREA	LOCATION	USE	MANAGING AGENCY	ROUTE
Tribal Sacred Area of the Confederated Salish and Kootenai Tribes	Between St. Ignatius and Seeley Lake	Tribal members only	Tribal Council of the Confederated Salish and Kootenai Tribes	Jocko
National Bisen Range	Between Dixon and St. Ignatius	Buffalo preserve, recreation	USFWS	Jocko
Blackfoot-Clearwater Game Management Area	Between Ovando and Seeley Lake	Big game winter range	MDFWP	Jocko
Lewis and Clark Trail	Lolo to Ovando	Historic, recreation	USFS on USFS land USNPS on other land	All routes
Stark Mt. Trail	Ninemile area	Recreation	USFS	Taft N & S
Domestic Water Supply	Tarkio	Water supply	USFS	Taft N & S
Rock Creek Recreational Waterway	30 mi stretch of Rock Creek	Recreation	MDFWP	Taft N & S
Blue Mt. Recreation Area	Miller Creek area	Recreation	USFS	Taft N & S
Thompson Falls Airport	Thompson Falls	Airway	Sanders County	Plains N & S, Jocko, Hot Springs
Elliott Air Field	Between Clinton and Bonita along Clark Fork	Emergency landing strip	MDOC	Hot Springs, Taft N & S
Mission Mountains Tribal Wilderness	Between St. Ignatius and Seely Lake	Recreation	Tribal Council of the Confederated Salish and Kootenai Tribes	Jocko
Blackfoot River Conservation and Recreation Corridor	Missoula/ Powell county line to Johnsrud Park	Recreation	MDFWP	Jocko, Hot Springs
Rock Creek Canyon	Near Kitchen Gulch	Airway	MDOC	Taft S, Plains S
Clark Fork Crossings	Clinton	Airway	MDOC	Taft N
	Alberton	Airway	FAA	Taft N & S Plains S
	Eddy Islands	Airway	FAA	Plains N, Jocko Hot Springs
	Weeksville	Airway	FAA	Hot Springs Plains N, Jocko
	Gold Creek	Airway	FAA	Hot Springs, Taft N, Jocko
	Plains	Airway	Sanders County	Plains N & S Hot Springs, Jocko
	St. Regis	Airway	FAA	Taft N & S
Lookout and Mullan Pass	Montana-Idaho border	Airway	FAA	Taft N & S
Flathead River	Dixon Crossing	Airway	FAA	Hot Springs, Jocko
Ninemile Divide	North of Alberton	Airway	FAA	Plains S

ADDITIONAL INFORMATION

RARE II AREAS

A recent federal court decision (California vs. Bergland, 9th Circuit Court of Appeals) has complicated the Rare II process for USFS. The federal court ruled that in California, USFS did not adequately assess the impacts of its decision to eliminate areas from the Rare II process. The implications of this decision on Rare II areas in Montana are being studied by the USFS.

The proposed transmission line could potentially affect five Rare II areas in Montana. The Taft Route crosses four, one near Stark Mountain, a second near Siegel Pass, the third is south of the Clark Fork near St. Regis, and the other is near Twelvemile Creek, west of St. Regis. The Plains Route also crosses the Rare II area near Siegel Pass and another in the John Long Mountains.

CROSSING OF THE FLATHEAD INDIAN RESERVATION

The Confederated Salish and Kootenai Tribes say that existing BPA right-of-ways across the Flathead Indian Reservation are limited to a term of 50 years (1951-2001). They dispute BPA's authority to use the vacant portion of the Hot Springs-Anaconda right-of-way for double-circuit 500-kV transmission lines, arguing that such use would burden tribal lands in a way not contemplated by either the Tribes or BPA when the right-of-way was granted.

It is BPA's position that the agency applied for, appraised, and paid for a right-of-way with an unlimited term and that the use of the vacant portion of the right-of-way is an alternative location for the proposed line.

The tribes have indicated that they are willing to negotiate use of the Hot Springs corridor.

AVIATION HAZARDS

The Montana State Division of Aeronautics has identified several areas where the proposed line could cause aviation hazards. These hazards could be reduced by appropriate marking, except for the Rock Creek crossing. Rock Creek Canyon is an important aerial navigation route from the Bitterroot Valley eastbound and it is the only Visual Flight Rules (VFR) route eastbound during low cloud cover. The Aeronautics Division says that a powerline over 200 ft above ground level would constitute an unacceptable aviation hazard (see Appendix A).

BPA, USFS, and the Division of Aeronautics of the Montana Department of Commerce are working to reduce the impacts of the Rock Creek crossing, possibly by changing the line location. Relocation could reduce the height of the line at the crossing from 600 ft to 175 ft.

RECREATION/AESTHETIC IMPACTS

The mountains and valleys of western Montana are nationally-known destinations for outdoor recreation. Many residents live here because of opportunities to hunt, fish, hike, ski, and enjoy the scenery. Popular recreation activities such as driving for pleasure, camping, fishing, picnicking, hiking, and hunting (Wallwork et al., 1980) depend on enjoyment of scenic beauty.

DNRC identified nine categories of recreation resources that could be adversely affected by the transmission line: wilderness areas, roadless areas, scenic roads, national and state trails and rivers, intensive recreation areas, high-value fisheries, historic sites, and public and private lands used for dispersed recreation activities.

The transmission line would have three primary types of impacts on these recreation resources.

The towers, access roads, and right-of-way visually intrude on recreation settings, whether they are developed or dispersed. This decline in the scenic quality can adversely affect recreation visitors, especially in settings where concern for natural scenic beauty is high. The line and access roads would conflict with recreation management guidelines and visitor expectations for undeveloped landscapes, even if the actual visual impact is small.

Access roads can open new areas for recreation, benefitting recreationists who desire to use them. DFWP is concerned about access roads and their potential impacts on wildlife habitat, which is linked to many recreation activities. The most recent proposal for managing the Lolo Forest stresses maintaining opportunities for dispersed recreation and discouraging new access roads (Flynn 1982).

ADDITIONAL INFORMATION

Five unique recreation resources in the study area that might be affected by the various routes include: (1) The Blackfoot River Conservation and Recreation Management Corridor, (2) the Mission Mountains Tribal Wilderness, (3) the South Fork of Jocko Tribal Primitive Area, (4) the Rattlesnake National Recreation Area, and (5) the National Bison Range. Impacts to these areas would be long-term and severe.

THE BLACKFOOT RIVER CONSERVATION AND RECREATION MANAGEMENT CORRIDOR.

This is a 30 mi stretch of river, used heavily by anglers and floaters, is protected under a local-state-federal program of scenic easements and public access. This preserves the recreational qualities of the river without making a formal designation under the federal Wild & Scenic Rivers System. The transmission line would conflict with recreational uses of the river on and near this special management area.

THE MISSION MOUNTAINS TRIBAL WILDERNESS.

The Tribal Council of the Confederated Salish and Kootenai Tribes of the Flathead Indian Reservation established a Wildland Recreation Department that in 1982 published a management plan for this 89,500 acre area on the western slope of the Mission Mountains. The Wilderness Management Plan and Ordinance used language similar to the Wilderness Act of 1964, and specifically considers the need and value of wilderness in Salish and Kootenai culture. The transmission line, access roads, and related development would conflict with the Tribes' management plan and recreational use of the wilderness.

THE SOUTH FORK OF JOCKO TRIBAL PRIMITIVE AREA.

Also known as the Tribal Sacred Area, this land lies south of the Jocko Pass Road where it abuts the Tribal Wilderness. This area has unique management mandate: only tribal members are allowed to use the area. MPC maintains a 230-kV, wood pole transmission line in the Primitive Area, and another line would create severe cumulative impacts. The Tribal Wildland Recreation Department is currently writing a management plan to protect and preserve the wilderness values of the Primitive area.

RATTLESNAKE NATIONAL RECREATION AREA AND WILDERNESS.

The 30,000 acre Rattlesnake National Recreation Area was created in October 1980 (PL 96-476). An additional 30,000 acres were set aside as Wilderness. Legislation creating the Rattlesnake National Recreation Area mandates protection and preservation of the setting's primitive recreation values. In 1978, 85 percent of the visitors polled did not want additional development in the Rattlesnake (Kelley 1979). The most popular activities enjoyed by visitors surveyed were viewing scenery, relaxing, hiking and walking, studying rock formations, exploring, viewing wildlife, and nature study -- all of which depend on appreciation of scenic beauty. A wood pole line crosses the Rattlesnake. The proposed 500-kV transmission line could cause severe impacts in the Rattlesnake because it is inconsistent with management guidelines and visitors' expectations for visual quality.

NATIONAL BISON RANGE.

The Bison Range, an 18,500-acre area established in 1908, affords visitors an opportunity to see a herd of 300 to 400 bison, and herds of elk, bighorn sheep, antelope, and deer. About two-thirds of the visitors drive the 19-mi scenic loop road, which has a vista of the Mission Range and Flathead Valley. The northeast corner of the Bison Range has two transmission lines running through it, but the wood pole towers do not impair the view from the loop road (Malcolm 1982a). The proposed 500-kV line would be intrusive, especially when combined with the two existing transmission lines.

REDUCTION OF IMPACTS

The main impact to recreation settings would be the visual intrusion of the line. Mitigation strategies designed to reduce visual impacts are discussed in the Socioeconomic/Aesthetic section. When a centerline is chosen, impacts could be reduced by studying recreation problem areas and proposing additional mitigation, which could include adjustments in location of the line and access roads. Effective management of access roads, coordinated with the DFWP and private landowners, will reduce the effects of improved or new access to recreation settings.

Paralleling an existing right-of-way would not be an effective way to reduce impacts to recreation resources. The 500-kV towers are much taller than most existing transmission towers in Montana, and the line would therefore visually dominate any setting, regardless of existing transmission lines or other forms of development.

EFFECTS ON TERRESTRIAL ECOSYSTEMS

The study area contains productive habitat for big game animals such as mule deer, white-tailed deer, and elk, and also for rare, threatened and/or endangered plant and animal species, including grizzly bear, bald eagle, peregrine falcon, Howell's gumweed, and Spalding's silene.

Secure summer habitat and winter range for deer and elk are along all corridors. Large areas of secure summer range occur in large roadless areas of the John Long Mountains west of Maxville and north of the Clark Fork near St. Regis. Big game winter range is along slopes adjacent to major drainages such as the Clark Fork, Blackfoot, and Flathead rivers, Miller, Flint, and Schwartz creeks. Bald eagles winter along the Clark Fork, Blackfoot, and Bitterroot rivers, and nest near Paradise along the Clark Fork and near Clearwater Junction along the Clearwater River. Grizzly bear habitat and denning sites are near Jocko Pass and Evaro. An important grizzly bear migration corridor is near Seigel Pass and Bighorn sheep inhabit south-facing slopes north of the Clark Fork between Plains and Thompson Falls.

BPA described impacts to terrestrial ecosystems in the draft EIS, and mapped areas of concern. DNRC believed that additional information was needed on the effects of access roads on big game winter range and secure summer habitat and mitigating measures to reduce these impacts.

ADDITIONAL INFORMATION

EFFECTS OF CONSTRUCTION

The construction of the transmission line may displace animals from favorable habitat and impose stress which could result in decreased wildlife populations and affect wildlife-oriented recreation. Bighorn sheep, mountain goat, elk, and deer are known to avoid areas disturbed by human activities. Noise from machinery and vehicles during construction could displace these animals from secure summer habitat and winter range. Special use sites such as raptor nests, waterbird colonies, grizzly bear denning sites, and big game calving and wintering areas could be abandoned as a result of construction disturbance. Increased death or decreased birth rates may result from stress caused by construction disturbance.

EFFECTS OF ACCESS ROADS.

BPA plans to build between 300 and 500 mi of new access roads. In steep terrain, 4.0 or more mi of access road could be required per 1.0 mi of line. Flatter areas could require as much as 1.0 mi of new access road per 1.0 mi of line. This may displace animals from favorable habitats and impose stress which could result in decreased wildlife populations and affect wildlife-oriented recreation.

The relationships among roads, elk habitat quality, and elk hunting quality has been the subject of a ten-year cooperative state/federal study involving USFS, BLM, and DFWP (Lyon et al. 1982). This research has shown that increased road densities in elk habitat could render animals more vulnerable to hunting. This commonly causes more restrictive hunting regulations in the form of shorter seasons or hunting by permit only. Shorter seasons and permit hunting are unpopular with hunters and could decrease revenues available for wildlife management and local economies in the form of license fees and recreational expenditures. Elk license revenues in 1978 totaled $4.4 million in Montana (Conner and Cada 1982). A conservative estimate of elk hunter spending is $45 per day, which contributes an additional $29 million to the state's economy each hunting season.

Most of BPA's new access roads will be maintained for the life of the project and could be used by snowmobilers, motorcyclists, and hunters, thereby causing long-term displacement of big game animals from secure summer habitat and winter range.

New access roads increase access for firewood cutters, who often cut standing dead trees and snags. A loss of habitat for birds that depend on standing dead trees for feeding, perching, or nesting could result. Certain birds of prey (such as eagles, osprey, and hawks) avoid human activities and could abandon nests near the right-of-way during construction and operation of the 500-kV line. Abandonment of nesting sites could result in a lower reproductive rate, for birds, especially during construction. Access roads could improve access for loggers, making harvest of marginal stands of timber economically feasible. This logging, in areas that would otherwise be untouched, would cause additional impacts to wildlife.

WIRE STRIKES.

Waterfowl and other birds are known to collide with transmission lines (James and Haak 1979, Beaulaurier 1981, Meyer 1978, Malcolm 1982b). Transmission lines near waterfowl migratory corridors and concentration areas pose the greatest risk for losses. There are heron nesting colonies along the Clark Fork near Thompson Falls and waterfowl breeding areas between Ovando and Clearwater Junction. Except for these areas, the project poses a minimal risk of wire strike losses.

WEEDS AND HERBICIDES.

A long-term impact of the proposed action will be the loss of vegetation on access roads and substation sites. These areas will be cleared of vegetation by herbicides or mechanical means for the life of the project. In Montana, BPA uses herbicides for three purposes: (1) weed and brush control, (2) prevention of stump resprouting, and (3) sterilization of substation areas. Aerial spraying of herbicides for right-of-way vegetation management is not proposed (Frick 1982). Once natural plant communities have been disrupted, the invasion and proliferation of noxious weeds could be long term. The Montana Weed Control Act (MCA 80-7-701) requires landowners or counties to control noxious weeds. On privately-owned land BPA usually contracts with county weed control boards for control of noxious weeds. In those cases, the choice of herbicides is left to the county.

Weed control is conducted almost exclusively with chemical herbicides. The most commonly-used herbicide by BPA in Montana is Tordon 101, which contains about 0.5 lb of picloram and 2.0 lb of 2,4-D per gallon, and which affects broad-leafed plants but not grasses. BPA reported that in one study 2,4-D treatment of a field to control tansy ragwort caused a 22 percent mortality in honeybees. Honeybees ensure normal fruit and seed production by pollinating crops and plants. Herbicide use could adversely affect terrestrial ecosystems by eradicating broad-leafed shrubs and forbs that are wildlife forage and cover.

Pramitol 5 PS is the soil sterilant commonly used at substation sites in Montana; application of up to 200 lbs/acre are reported by BPA (USDOE 1981). Telvar (a soil sterilant), Ammate XNI, and Banvel 4WS are used in relatively small amounts for local vegetation control and treatment of stumps. BPA may not apply these herbicides within 100 ft of flowing streams (Tyree 1982).

RARE OR ENDANGERED PLANT SPECIES.

Montana has no plants listed as threatened or endangered, but a number of Montana plants are being studied for these classifications. Two of these species are in the study area. One species, Spalding's silene, has been collected near Hot Springs, and another Howell's gumweed occurs in the vicinity of Clearwater Junction. Construction and maintenance of the line could jeopardize these species, unless a careful search along the centerline for habitat is made prior to construction and appropriate mitigating measures are taken to protect any populations which may be found on the right-of-way.

REDUCTION OF IMPACTS

Centerline studies to locate access roads and transmission towers would reduce terrestrial impacts. The centerline study could identify sensitive areas or habitats where special site-specific mitigating techniques should be implemented.

Impacts of access road construction on big game populations can be reduced by measures such as: maintaining dense cover adjacent to access roads, avoiding saddles or divides frequented by animals crossing ridges or drainages, maintaining ground cover where game trails cross roads, building low-standard, slow-speed, single-track access roads and removing slash so animal movement will not be inhibited. Impacts on seasonal use areas, such as winter ranges, nesting sites, and denning sites, could be reduced by restricting construction activities during sensitive periods. Stress on big game can be reduced by closing access roads through important habitat during the winter and spring to all motor vehicle traffic. Closing roads during the hunting season would mitigate, but not necessarily eliminate impacts of increased hunter harvest.

Damage from the use of herbicides to control noxious weeds along access roads could be reduced by monitoring the access roads to discover the first invasion of weeds and then treating them to prevent the establishment and proliferation of extensive stands.

Despite adoption of mitigation measures, the project is expected to have an adverse effect on wildlife populations in western Montana. DNRC and BPA agree that mitigation of impacts to wildlife and fisheries should be given high priority if the preferred Taft Route is chosen. Potential losses on this route could be severe and all reasonable mitigative measures should be taken to ensure that the project would cause minimum adverse impact. Construction and operation of the facility should be monitored to identify impacts requiring additional mitigating measures.

EFFECTS ON AQUATIC ECOSYSTEMS

Streams support systems of interdependent living organisms. Any reduction in stream habitat quality could affect the health or population of these organisms reducing fish populations by reducing their food supply. Many of the streams in the study area are high quality trout fisheries including the Blackfoot, Clark Fork, and Flathead rivers.

The project may decrease water quality through erosion, increased sediment loads, contamination from petroleum products and herbicides, soil disturbance, removal of vegetation, changes in streambed characteristics, flood damage, and water channeling through agricultural and residential land. Access road construction is the greatest potential source of sediment. DNRC felt that additional information was needed on (1) access roads, and (2) soil disturbance and sedimentation including detailed mapping of perennial streams and erosion hazard. Information gathered by DNRC to supplement BPA's impact analysis is presented below.

ADDITIONAL INFORMATION

BPA plans to construct between 300 and 500 mi of new access roads for maintenance of the transmission line. Access roads could cause short-term and long-term impacts to streams and rivers in the study area. During construction of roads and towers, vegetation is removed and erosion results. A study of transmission line rights-of-way in New York shows that roads and tower sites are sediment sources and increase stream sediment loads and turbidity (ESEEROC 1977). The removal of timber from forested areas can lead to an increase in water yields due to reductions in evapotranspiration and infiltration (Gray 1970) and these increases in surface flow can increase the amount of sediment entering a stream (BPA 1977). Vehicles fording streams, the installation of culverts, and disturbance of streambank vegetation also cause erosion. The highest erosion risk would occur on steep slopes that require the greatest number of access roads.

Increased sedimentation of streams reduces habitat quality for insects particularly stoneflies and mayflies the major food supply for trout. A reduction of the insect food supply could cause decreased fish populations. Sedimentation could reduce the reproductive success of fish by clogging gravel riverbottom spawning areas. Eggs could be covered with silt interfering with normal hatching, and fish might not spawn on heavily silted streambottoms. Trees and branches cut during construction, if allowed to clog streams, could restrict fish movement. Free movement is important to sustain fish populations, for example, the Clark Fork's fish population below Missoula spawns mainly in tributaries that could become inaccessible if debris were to block normal fish passage.

Herbicides could decrease fish populations by killing aquatic plants that provide food, cover, and oxygen for water organisms. Herbicides, especially 2,4-D, which BPA plans to use, can be toxic to fish. County weed control districts may be required to treat weed along access roads and herbicides could inadvertently enter streams during this process.

REDUCTION OF IMPACTS

Centerline studies could reduce impacts on aquatic ecosystems, identifying sensitive areas or habitats where special site-specific mitigation techniques would be implemented. Implementation of DNRC's construction guidelines which specifically address sources of erosion and sediment, particularly those resulting during access road construction, could further reduce aquatic impacts (see Appendix B). Adverse impacts to sport fish populations due to the project should be mitigated by BPA using reasonable means.

Communication between BPA and county weed control districts to coordinate herbicide application along access roads and right-of-way could minimize the possibility that herbicides would enter streams. BPA's herbicide application policy, if implemented by all agencies that apply herbicides, would substantially reduce the probability of adverse impacts.

IMPACTS ON CULTURAL RESOURCES

Cultural resources can be defined as the prehistoric and historic remains of human activities. These resources include physical remains (deposits, features, objects, or structures) and areas where significant human events have occurred, even if evidence of that event is no longer physically present. The value of a cultural resource site consists of the information about a past society's way of life that potentially could result from analyzing the remains and the site's environmental context. In some cases, the setting or environment of a property is considered to contribute to the qualities which make that site significant. Each site is a finite nonrenewable resource with unique potential for significance (Schiffer and Gumerman 1977).

Over 300 of these sites lie in the study area. Some have not been field-checked and their location and condition are unconfirmed. A list of these sites is on file at DNRC. It is probable that additional sites will be discovered by an on-the-ground survey before construction. Clearing of the right-of-way, tower footing excavation, and road construction might uncover sites that were not detected by an on-the-ground survey.

BPA will follow procedures mandated by Federal Historic Preservation Laws. To avoid such impacts, a walking survey of the study area will be performed by an experienced group of archaeologists and historians familiar with the type of sites that could be found. This will ensure that all properties that would be affected by the project will be identified and fully evaluated for eligibility for listing on the National Register of Historic Places.

Eligible sites will be further evaluated to determine whether construction activities can avoid them or whether a plan for more detailed mitigation is necessary.

ADDITIONAL INFORMATION

BPA and DNRC agreed that the following impacts could occur as a result of construction. Destruction of cultural structures, features, and subsurface archaeological deposits are long-term impacts to nonrenewable cultural resources. Destruction could occur in the proposed right-of-way, access road areas and in excavation, equipment storage, and staging areas outside of the right-of-way. Blasting and drilling for tower footing excavation could damage archaeological sites. The isolated character of a site may be lost if access roads are not well-planned. Archaeological deposits could be degraded by vehicle traffic and regrading of access roads during the maintenance of the transmission line. Increased runoff from poorly-graded roads could wash away archaeological deposits.

Increased accessibility made possible by access roads could increase vandalism and looting of historic and archaeological properties. Relic collecting or vandalism could cause long-term impacts. New or improved access roads to remote unmanaged sites could cause increased vandalism, perhaps resulting in destruction of the site. The stripping of structural remains at historic sites and theft of artifacts would be a severe impact.

Adverse effects to historical or archaeological sites can occur with the introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting (36 CFR 800.36). Visual intrusion is a long-term impact whose severity cannot be predicted until it is known where the powerline will be sited. The visual intrusiveness of the powerline and associated facilities such as access roads could adversely affect archaeological sites such as prehistoric rock art or vision questing locales. Historic sites such as homesteads, ranchsites, and mining townsites are more susceptible to visual impacts than archaeological sites that lack structural features or consist only of subsurface deposits.

REDUCTION OF IMPACTS

FEDERAL REQUIREMENTS

A walking survey of the study area will be performed by an experienced group of archaeologists and historians familiar with the type of sites that could be found in the impact area of the powerline corridor. This will ensure that undiscovered cultural resources will be identified and fully evaluated. Montana State Historic Preservation Office (SHPO) will review the work performed by the survey team.

Following the survey of the right-of-way, access roads, and staging areas BPA-SHPO evaluation of impacts and proposed mitigating measures will be reviewed by the President's Advisory Council on Historic Preservation (ACHP), and a formal plan for implementing these measures will be adopted by BPA. Adhering to federal laws governing historic preservation and following the ACHP recommendations would satisfy MFSA requirements.

Destruction or degradation of cultural resources can be prevented or reduced by a number of measures. SHPO recommends the following measures for inclusion in the formal plan for mitigating impacts to cultural resources. The measures could be contained in a memorandum among SHPO, BPA, and ACHP and include the following: (1) design access roads or change tower placements to avoid alteration or destruction of cultural sites and where necessary to reduce cultural impacts; (2) recover archaeological and historic data from sites that

will be destroyed during construction (this recovery could include excavation of archaeological sites and photographing or drawing affected historic properties); (3) stabilize or bury archaeological sites under a protective layer of soil to prevent adverse effects; (4) reseed access roads to reduce visual impacts or to help prevent unwanted site visitation and possible vandalism; (5) prevent or reduce visual impacts on cultural sites by careful landscaping to screen the transmission line, tower darkening, and use of non-reflecting conductors to camouflage the transmission line; (6) monitor construction to help ensure that sites are not irretrievably altered by construction activities and that avoidance measures agreed to by all parties are carried out; and (7) continue monitoring during the operational phase to protect significant sites on the permanent right-of-way from vandalism for the life of the transmission line.

EFFECTS ON LAND PRODUCTIVITY

Any reduction in land available for the production of grain and other crops, timber, or livestock is an important concern in western Montana. The project would cause a long-term reduction in land productivity.

BPA discussed land productivity impacts in BPA's draft EIS and in a supplementary document (Skogley and Smith 1982). DNRC found BPA's treatment of impacts did not sufficiently address impacts of access roads on land productivity. DNRC performed additional analysis and information was mapped for the Jocko Route, the Drummond-Maxville area, and the Missoula-Miller Creek area. Land productivity data mapped by BPA were used in DNRC's route comparison.

ADDITIONAL INFORMATION

TIMBERLAND

Timber losses result from construction and maintenance of access roads and right-of-way clearing. Timber growth would be prevented over the life of the project on about half the right-of-way, or about 8.0 acres of timberland per 1.0 mi of centerline. During construction, an additional 3.4 acres of land are taken out of production per 1.0 mi of access road. The Taft substation would remove 5.0 acres of forested land from production. Timber losses are more important in the highly-productive forests of the extreme western portions of Montana, where production per acre per year is four to ten times greater than in the drier forests farther east. Current stumpage value of timber in western Montana is about $50 to $65 per 1,000 board feet (Moore 1982). The dollar value of lost timber production would be higher than the value of lost rangeland or cropland production.

CROPLAND

About 0.30 acres of cropland per 1.0 mi of centerline would be removed from production by tower bases and the Plains substation would remove 20.0 acres of cropland from production. According to BPA, cropland displaced by construction of access roads will be restored to full productivity in the year after construction activities, but farm machinery could not operate near tower bases for the life of the project. Operation of heavy construction equipment can lead to soil compaction which reduces the porosity of a soil, restricts root penetration, and changes water movement in a soil. Soil compaction could reduce cropland productivity for several years. The value of crop production on irrigated land averages about $155/acre/year in western Montana, and nonirrigated cropland averages about $80-$90/acre/year. BPA will compensate farmers and ranchers for productivity losses (Van Winkle 1982).

RANGELAND

Access roads would cause the greatest long-term loss of range productivity. About 3.4 acres of land are taken out of production per 1.0 mi of access road. Losses due to the presence of tower bases are negligible since livestock could continue to graze under towers. The value of grazing land in terms of livestock production averages about $30/acre/yr in grassland and $15/acre/yr in forested land (Van Winkle 1982).

REDUCTION OF IMPACTS

Loss of timber production from right-of-way and access road clearing is generally not mitigable. Cropland losses can be reduced by siting towers along fences or section lines and spanning fields. Interference with irrigation systems could be reduced by centerline selection, and BPA could adjust existing irrigation systems or install substitute systems if avoidance would not be possible. BPA will compensate landowners for lost productivity. Impacts to rangeland could be reduced by using existing roads for access, and reclaiming and reseeding access roads.

CONSTRUCTION CONSTRAINTS

Certain geologic and soil conditions limit the location of the transmission line. Access roads and transmission line construction and maintenance activities could have adverse effects on soils. This discussion presents additional information on geology and soils to supplement information presented in BPA's draft EIS.

ADDITIONAL INFORMATION

GEOLOGIC AND SOIL CONSTRUCTION CONSTRAINTS

Proper design of a transmission line allows construction through rugged terrain, but certain areas should be avoided to reduce potential hazards and to keep maintenance costs down. Location and design of access roads must be done judiciously to reduce the potential for road failure. Four types of geologic and topographic conditions constrain the siting of transmission lines and access roads: (1) problem soils, (2) steep slopes, (3) mass movement areas and (4) seismic activity. Table 7 lists areas on each route known to have these geologic characteristics; additional areas may be found during centerline selection.

Problem soils have one or more of the following properties: low bearing strength, high shrink-swell potential, and high frost action potential. These soils may have high erosion potential and construction activity on many of these soils may result in airborne dust or compacted soil. Soil compaction is most pronounced when soils are moist.

DNRC considered two slope categories to pose constraints to construction: moderate constraints resulting from slopes 16 to 30 percent, and greater constraints from slopes steeper than 30 percent. Constraints on slopes greater than 30 percent include: (1) increased construction difficulty from reduced equipment mobility (2) greater risk of injury to personnel, (3) greater potential for mass movement, and (4) increased difficulty in building access roads.

TABLE 7. SPECIFIC GEOLOGIC CONSTRAINTS FOR BPA'S PROPOSED TRANSMISSION LINE

JOCKO ROUTE

AREA	GEOLOGIC CONSTRAINT
Garrison-North to Blackfoot River	- Problem soils
Segment 5B	- Man-caused slumps - Active slumps - Steep slopes
Blackfoot River to Clearwater River	- Wet areas
Tribal Jocko Primitive area	- Wet areas
North of Jocko Pass	- Talus slopes with unstable soils
St. Ignatius to Little Bitterroot River	- Erosion - Fine-grained lacustrine sediments - Slumps
Plains to Thompson Falls	- isolated problem soils - talus slopes
West of Thompson Falls	- steep slopes
South of Markle Pass	- The Giant Ripple Marks National Natural Landmark

HOT SPRINGS ROUTE

AREA	GEOLOGIC CONSTRAINT
North of Garrison substation	- Potentially unstable slopes at edges of benches - Problem soils
Gold Creek	- Site of an earthflow
Potomac Area	- Problem soils - Steep slopes
East side of Mt. Jumbo	- Landslide
East side of Grant Creek	- Landslide
Segments 115 and 116	Glacial Lake Missoula sediments
Segment 117	Clay soils from tertiary sediments

TABLE 7 (cont.)

From Flathead Reservation to Hot Springs	- Areas of problem soils - Slope failures near Arlee & Dixon
Hot Springs to the West -- Same as Jocko Route	

TAFT SOUTH ROUTE

AREA	GEOLOGIC CONSTRAINT
Southwest of Garrison Substation	- Problem soils
Flint Creek Range	- Isolated sandy soils on intrusives
Near Maxville	- Isolated slumps - Steep slopes
North of Pikes Peak Creek	- Isolated talus slope
West of Pioneer Gulch	- Clay soils
John Long Mountains	- Steep slopes - Isolated clay soils - Isolated slumps - A road failure
Rock Creek to Miller Creek	- Steep slopes
South of Mouth of Miller Creek	- Problem soils
West of Blue Mountain	- Road failure
Between Bitterroot and Clark Fork	- Steep slopes
Segments 10 and 15	- High mass movement potential
West of the mouth of Ninemile Creek	- Moderate and steep slopes - Problem soils
Clark Fork River	- Isolated bank slumping in Lacustrine sediments.

PLAINS

AREA	GEOLOGIC CONSTRAINT
Garrison to mouth of Ninemile Creek	- Same as Taft South Route
Mouth of Ninemile Creek to Plains	- steep slopes - talus slopes

TABLE 7 (cont.)

Plains to Montana-Idaho Border	- same as Jocko Route

TAFT NORTH

AREA	GEOLOGIC CONSTRAINT
North of Garrison Substation	- Problem soils
Gold Creek	- Man-caused earthflow
North of Drummond to Miller Creek	- Moderate and steep slopes
Segment 121	- Thin soils - Talus slopes
West of Miller Creek -- See Taft South	

In some areas where timber is removed, soils remain moister because of reduced evapotranspiration. These areas may be more prone to mass movement than are undisturbed areas (Dunne and Leopold 1978). Additionally, the slope stabilizing effect of live root systems is lost as the root systems decay. Rockfalls, talus slopes, and other landslide-prone areas constrain the location of towers and roads. Poorly sited roads and towers can trigger mass movements. Table 7 lists areas where landslides have been identified in the study area.

Seismic activity is not a major constraint to transmission line siting. Substations are designed to accommodate ground movement and towers are designed to withstand wind-induced vibrations, but should be located away from known faults. Footings should be designed to withstand the secondary effects of an earthquake such as landslides, liquefaction, and ground displacement.

SOIL IMPACTS

During the construction of roads and towers, protective plant cover is removed and the soil surface is exposed. Sheet, rill, and gully erosion will result. Sheet erosion is the removal of a uniform layer of soil from slopes as a result of raindrop impact. If this flow is concentrated into small channels, rill erosion begins to occur. If no preventive measures are taken, gullies can develop from rill erosion. Machinery working on wet soils with poor bearing strength can cause gully erosion if water is not funneled away from the road surface.

Operation of heavy equipment can lead to soil compaction and the formation of ruts. Soil compaction commonly occurs in moist soils. On soils that cannot be compacted puddling may occur. A puddled surface reduces the permeability of a soil (Chancellor 1977) and compaction reduces the porosity and permeability of a soil, restricts root penetration, changes water movement in a soil, and can increase runoff (BPA 1977; Hatchell et al. 1970) or result in a small increase in groundwater. Fuel spills could contaminate groundwater, but BPA's proposed project poses only a small risk to groundwater.

ICING HAZARD

Ice or snow can form on conductors and damage transmission lines. A large accumulation of ice adds weight and wind resistance to the line which causes stress on the towers. Conductors may break or towers may collapse, resulting in power outages and expensive repairs. In the winter of 1977-78, icing along the Dworshak to Hot Springs 500-kV line caused an overhead ground wire to fail (Twiggs 1983), causing intermittent short circuiting of the line. Electrical service was not restored until several days later because the line was inaccessible.

There are not enough data on western Montana weather conditions in specific areas to determine a rate for the incidence of icing because precipitation varies with elevation in a complex way. Two points at the same elevation in the same valley may get different amounts of precipitation. During winter months much of the precipitation which falls in mountains is too cold to cause icing. The relationship between amount and timing of precipitation and average temperature during periods of rain and snow fluctuate widely from one area to another in western Montana.

UNDERGROUNDING

Undergrounding consists of burying insulated and cooled conductors in a trench or concrete lined bunker. More ground disturbance is required in undergrounding than in conventional overhead construction, therefore more erosion, sedimentation, and soil compaction would be expected from undergrounding. Minor increases in soil temperature could result from undergrounding. If high pressure oil-filled cable is used the chance of small oil spills contaminating groundwater or surface water would exist for the life of the project.

REDUCTION OF IMPACTS

During the centerline selection process, areas having landslide hazards should be identified and avoided where possible when locating towers and access roads. Identification should be made by a geologist/soil scientist member of the centerline selection team.

RESIDENTIAL LAND DEVELOPMENT

Residential land development would be prohibited in the 125-ft right-of-way for the life of the project. BPA conducted a literature search to determine the effects of a 500-kV line on land values. The results were inconclusive, and none of the studies included Montana. BPA assumes there will be no impacts to land adjacent the right-of-way. BPA would compensate developers who had platted subdivisions that would be crossed by the right-of-way. BPA cannot compensate landowners whose land is not directly crossed by the right-of-way even if the value of their land might be adversely affected by the visual impacts of the line.

ADDITIONAL INFORMATION

The transmission line's electrical field and noise impact zones would extend beyond BPA's proposed right-of-way. Public concern about aesthetic and health effects could result in land adjacent the right-of-way being seen by potential buyers as less desirable for purchase than land without a transmission line. Residential development of land near the right-of-way could be delayed or mobile homes and multi-family dwellings could be built in areas which would otherwise have been developed for single-family homes. Montanans' concern about the effects of the 500-kV line may lessen, and development near the right-of-way could occur. In the Missoula area homes have been built next to a 230-kV line. Impacts would be reduced if BPA acquired a wider right-of-way.

ELECTRICAL AND BIOLOGICAL EFFECTS

The electrical effects of high voltage AC transmission lines can be divided into two general categories, those caused by "corona" and those caused by electromagnetic fields.

Corona is air ionization at a conductor surface where there are irregularities such as raindrops, ice crystals, or nicks and scrapes. "Electromagnetic field" is the term used to define the area affected by electric and magnetic emanations from a transmission line.

ADDITIONAL INFORMATION

The following discussion of potential impacts is based on two reports prepared for DNRC (Electric Research and Management, Inc. 1982, Sheppard 1983), both are available from DNRC. Several of the potential impacts described below are well-understood and were adequately described in BPA's draft EIS, and are summarized here. DNRC gave special attention to two other potential impacts, noise and biological effects on humans, since BPA did not adequately deal with these issues. Public concern and scientific disagreement regarding biological effects on humans led DNRC to reexamine this issue.

CORONA EFFECTS

Transmission Line Noise

Corona activity on the surface of high voltage transmission lines produces a hissing and crackling noise, especially during wet weather. The high pitch of corona noise makes it more annoying than lower frequency sounds of the same loudness. Transmission line noise is also unusual in that it comes not from a single point, but from numerous sources distributed along the line. Consequently, transmission line noise does not fade as rapidly as single-source sounds as one moves away from the source.

The loudness of sounds is expressed in decibels (dBA). The dBA scale begins at 0, which is defined as the intensity at which sound becomes audible to young people with normal hearing. Each 10 dBA increase in loudness approximately doubles the perceived loudness, so that a 60 dBA noise sounds about twice as loud as a 50 dBA noise. People have difficulty detecting loudness differences less than 3 dBA. Loudness of some common sounds is given in Table 8.

TABLE 8. SOUND LEVELS OF COMMON SOUNDS*

Threshold of Hearing	0 dBA
Rural area at night, no wind	20-30 dBA
Auto, 400 ft	51-58 dBA
Large Retail Store	60 dBA
Conversation, 8 ft	60 dBA
Snowmobile, 100 ft	72 dBA
Chainsaw, 100 ft	104 dBA

* (Electric Research and Management 1982; Golden et al. 1979)

Virtually all transmission lines in existence today have been designed to keep corona effect and consequent noise at the lowest attainable level. However, there is a limit to the extent that corona can be reduced by design. Much of the corona effect results from surface irregularities in the conductor, such as burrs and nicks occurring during manufacture and installation, or from organic material such as insects, and airborne debris.

Corona is enhanced by snow flakes, ice crystals, and water droplets on the conductors, which explains why corona activity and the resulting noise is more severe during wet weather. This includes all forms of precipitation and conditions where fog is sufficiently dense or conductors are sufficiently cool to result in condensation on the conductors. There are no conclusive data regarding the percentage of time that foul weather conditions occur in the vicinity of the proposed transmission lines.

Transmission line noise increases at higher elevations because decreased air density results in the onset of corona at lower electric field strengths. A correction factor of 1.0 dBA increase per 1,000 ft elevation is used in this report to take the phenomenon into account.

The noise level at the right-of-way edge during foul weather at 3,000 ft elevation is expected to be 55 dBA or above for at least half the time. Noise could be heard in homes as much as 500 ft from the right-of-way edge during foul weather if the windows were open and the home was quiet. In fair weather, the noise level would be 30 dBA or more at least half the time. No impact would be expected to occur at this level (see table 8).

Even the loudest noise produced by the lines would be too low to cause health effects such as hearing loss, but would be high enough to be a nuisance. Estimates of the nuisance level from noise have been made by measuring community response to noise, and by laboratory studies of sleep interruption and interference with conversation.

Based on nationwide community response data, it can be expected that the noise levels found at the edge of a 125-ft right-of-way during foul weather would highly annoy 6 percent of the people exposed. The percentage of people expected to be highly annoyed decreases to 2 percent for noise levels expected 100 ft from the right-of-way edge and zero beyond 300 ft.

Data are insufficient to predict how much the noise would annoy people accustomed to the rural environments of western Montana. The nationwide data discussed above were obtained largely from urban and residential areas where people would be expected to be more accustomed to noise. EPA's recommended day-night noise level limit of 55 dBA for "residential areas and farms" would be met at the edge of BPA's 125-ft right-of-way. Research since the EPA limit was established indicates that corona noise is more annoying than other noises of the same loudness, and that the limit applied by EPA should be reduced 5 dBA when applied to powerline noise. The adjusted EPA limit should thus be 50 dBA, which BPA's line would exceed by 5 dBA at the right-of-way edge. The 50 dBA limit would be met 70 ft beyond the right-of-way edge.

Noise levels in homes with windows closed would be no more annoying than ambient indoor sounds regardless of the weather conditions or proximity to the line. If windows were to be open during foul weather, powerline noise might reach annoying levels within the home. The degree of annoyance would depend upon proximity to the line, the sound conducting qualities of the building, and the normal noise levels in the home.

Noise levels in the right-of-way would cause people to speak more loudly to be heard. Although the noise produced by the line in foul weather would be more annoying than ambient sounds, the sound would not interfere with speech outside the right-of-way. During fair weather when outdoor activity is greatest, noise from the transmission line would be no higher than other common noises, and no impact would occur.

Powerline noise might be severe enough to interfere with sleep in homes within 90.0 ft of the right-of-way if windows were open during foul weather. The probability of sleep interruption decreases from about 8.0 percent for any given individual at the edge of the right-of-way to about 5.0 percent at 90.0 ft, based on findings of people's susceptibility to sleep disturbance.

Ozone Production

Corona causes breakdown of the air into component gases, of which only ozone has any known potential to harm health or property. Extensive study shows that the amount of ozone produced by a line is rarely measurable, and not a hazard (Shepphard 1983).

Radio and Television Interference

Corona can cause interference with AM radio (not FM, or 2-way radio communication systems) and television reception near the transmission lines, but this can be reduced through mechanical corrections to insulators and antennas, or by installation of remote antennas or repeater stations. BPA has previously committed itself to resolving radio and television interference problems, which should alleviate this impact.

ELECTROMAGNETIC FIELD EFFECTS

Electric fields in the transmission line environment are commonly measured in kilovolts per meter (kV/m). The maximum electric field under the lowest part of the conductor span, measured at the standard height of 1.0 meter (m), will be about 7.8 kV/m, and about 1.8 kV/m at the right-of-way edge (see figure 7). The field strength drops off rapidly away from the line, reaching the natural background level about 0.6 mi from the line. To put this figure in perspective, however, most household appliances and low-voltage wiring produce electric fields of about 0.01 to 0.1 kV/m, which is equivalent to transmission line fields 300 or more ft from the centerline. In other words, a person standing about 300 ft away from the line is being exposed to a field strength commonly found in houses.

On a dry day, the electric field under the lowest portion of the conductors is strong enough to produce a tingling sensation on the skin. This effect is thought to be caused by slight movement of body hairs. It would be more noticeable to persons on horseback or on equipment than to persons on foot, because the intensity of the electric field rapidly increases above the ground, and is much more intense at the top of an upright object such as a human body.

Another noticeable effect is caused by small spark discharges. Research shows that about 50 percent of the population can feel spark discharges in a 2.7 kV/m field, and find them annoying at 7.0 kV/m. There would be a 1.8 kV/m field at the edge of BPA's proposed right-of-way.

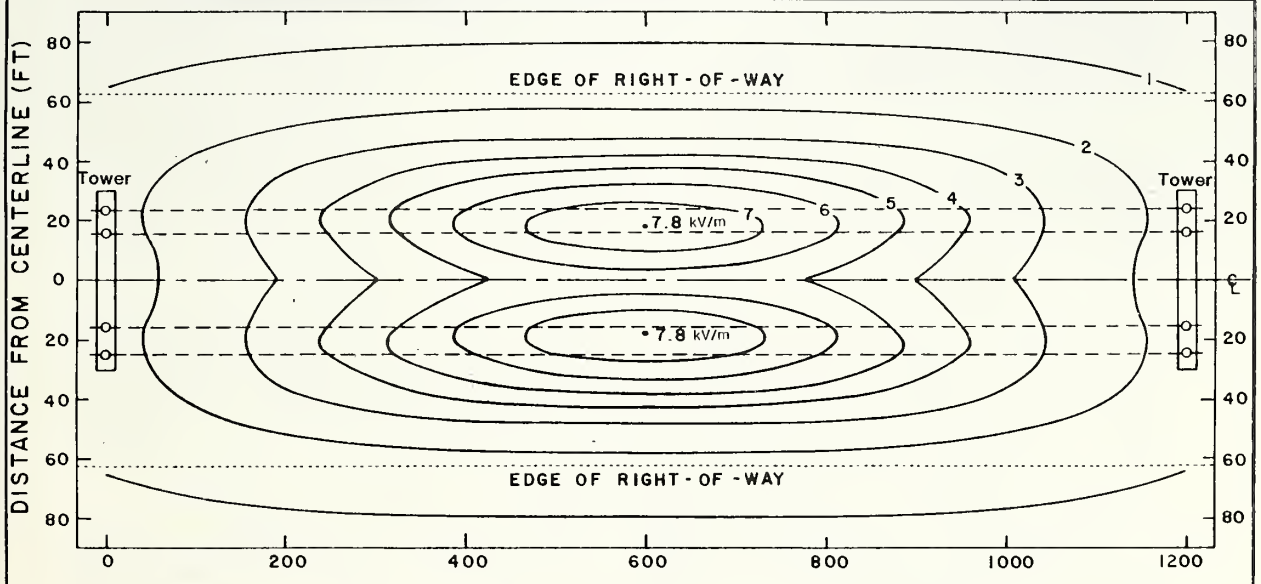
Interference with Cardiac Pacemakers

A cardiac pacemaker is an electronic device that artificially stimulates the heart, making it possible for persons with certain heart diseases to lead relatively normal lives. About 170,000 persons in the United States currently use cardiac pacemakers, one-third of whom could not survive without them.

Although pacemakers are susceptible to many forms of electrical interference, no deaths or serious malfunctions are known to have resulted from electromagnetic fields. However, absolute safety cannot be ensured under all circumstances because of the varying susceptibility inherent in the many different types of pacemakers and in the surgeon's placement of the electrical leads.

When exposed to an interfering electrical signal the circuitry of most pacemakers is designed to switch to a "reversion mode" wherein it continues to stimulate the heart but does not respond to heart stimuli indicating a need to beat faster or slower. The reversion mode is designed to be nonharmful, but cardiovascular specialists do not agree whether prolonged operation in this mode can threaten health (Scott-Walton et al. 1979).

FIGURE 7. ELECTRIC FIELD STRENGTH UNDER THE TRANSMISSION LINE



NOTE: Maximum calculated electric field strength contours at one meter above flat ground for a BPA 500-kV double-circuit line. Conductors are assumed to be 77 ft above ground at the towers and 35 ft above ground in the middle of the span. Electric fields in the transmission line environment are commonly measured in kilovolts per meter (kV/m). A field of 1,000 volts per meter is created by two flat plates separated by one meter and having a potential difference of 1,000 volts.

Source: Modified from USDOE 1982.

Under the most sensitive set of circumstances, a pacemaker could conceivably enter reversion as a result of the current passing through the body of a person touching an ungrounded vehicle near a large power line. The likelihood of this happening would depend on the sensitivity of the pacemaker, the size of the vehicle, and the field strength. With the most sensitive device even the small current from a car (with very high insulation to ground) parked in a region of 0.4 kV/m (about 60.0 ft from the right-of-way edge) could cause reversion. The apparent hazard is slight, because vehicles usually are not insulated from ground well enough to produce large currents, and the person touching such a vehicle probably would be poorly grounded because of his footwear, which would reduce or eliminate the current.

Risk to cardiac patients is unlikely, in that they would not be exposed for long periods to strong fields. The imperceptible current that sometimes passes through a person touching a household appliance often is stronger than the currents that result from touching objects in the powerline field.

Electric Shocks in Strong Electric Fields

Ungrounded metal objects near large transmission lines can develop considerable voltage, depending on their size and position. Investigation shows significant voltage can be produced in a long, ungrounded metal fence running along a right-of-way, or in a large ungrounded vehicle beneath the conductors. If the object is large and relatively near the line, a person touching it can become the pathway for a steady current to ground.

A spark results when an ungrounded person touches a grounded object. The spark is much like the one received upon touching a grounded doorknob after walking across a rug. The transient current can reach different magnitudes and produce different degrees of sensation. Peak currents are highest when a person discharges the spark through a metal object such as a metallic key. Currents about ten times smaller result if the finger is used for contact. The energy content of spark discharges from a carpet are about the same as those in the strongest part of the electric field under the powerline, although the alternating current in the powerline produces a continually recharging field so that repeated sparks are possible.

The maximum field under the line is about 7.8 kV/m (figure 7). Persons touching a fence in a field of 5.0 kV/m could receive currents as great as 2.2 milliamps. Although a large vehicle near a transmission line could theoretically develop a current up to 4.5 milliamps, measured currents are much lower, primarily because most vehicles are grounded. Tests in a 10.0 kV/m electric field with a farm tractor, jeep station wagon, and school bus found currents of 0.6, 1.1, and 0.9 milliamps, respectively. These currents are not dangerous to adults, but the hazard to children is not well-known. The "release current" in children is often cited as 4.5 milliamps, though there are scant data to support this figure. The "release current" is the level at which the individual can still voluntarily release the current source. Above this level, involuntary muscle contractions prevent release. There are no known incidents of children being harmed by such currents.

BPA is committed to reduction of shock hazards by grounding fences, gutters and other large metallic objects near the transmission line.

Honeybees

Public hearings on the Townsend-to-Garrison segment of the line determined there was public concern about possible adverse effects to honey producers. Honeybees can be severely affected by electrical fields of the strength that would occur under the proposed line. The effects include increased aggressiveness, queen loss, failure to produce honey, and hive failure. Research also indicates that bees are irritated by electrical fields of the strength that occur near the edge of the right-of-way. The effects can be substantially reduced if the hives are shielded. The research also indicates that honey production returns to normal if hives are located well away from the line.

Potential Health Effects

There are numerous conflicting reports about the possible effects of electrical fields on human health. DNRC concluded during its study of the Townsend-to-Garrison portion of the Colstrip transmission line that minor electrical field effects could occur outside the 125-ft right-of-way. Subsequently, the Board concluded that the line should avoid residences by an additional 75.0 ft on either side of the right-of-way. DNRC concluded that additional study was needed to determine the seriousness of these potential impacts.

The review of research results sponsored by DNRC concluded that no adverse health effects to people or to test animals have been found, but that some minor biological effects of unknown consequence have been demonstrated in test animals exposed to electrical fields comparable in strength to those that would exist under the proposed powerlines (Sheppard 1983). The demonstrated effects on test animals include changes in daily biological rhythms and blood cell counts, increased electrical response in nerve cells, altered rates of bone healing, reduced hormone levels in rats, and biochemical changes in brain tissue. These effects are slight, and no demonstrated effects on the health of either test animals or humans have yet been found in studies designed to explore the implications of the research. However, the findings do indicate the need for a cautious approach when determining acceptable levels of exposure.

The report found that standard methods of applying the results of animal research has not been very helpful in determining the effects of electric fields on people. This problem also indicates a need for caution when determining acceptable exposure levels for people.

REDUCTION OF IMPACTS

HUMAN HEALTH AND SAFETY

There is no clear cut answer whether a "health hazard" results from electric and magnetic fields. Examination of research results leads some to conclude that there is no demonstrated hazard, and therefore the line is "safe." Others find that the facts are too sparse to allow a decision. This controversy often revolves around the distinction between "effect" and "hazard." It is clear that not all "effects" are "hazards," but there is disagreement about which effects may be associated with hazards. The recommendations of this report are formulated in recognition of the distinction between hazard and effect, and with the understanding that some effects cannot be detected.

Laboratory experiments suggesting effects from long-term exposure to electric fields generally involve continual exposure for many days to fields stronger than would be experienced under the proposed transmission line. A person in a house at the edge of the right-of-way would be partially shielded from the electric field, although there are no data on the shielding capacities of various structures. Persons spending long periods of time outdoors, such as children playing in a backyard next to the right-of-way, or people using a recreation facility, might be exposed at levels approaching the levels where caution is indicated, and safety recommendations should be geared to this situation.

The report prepared for DNRC concluded that although research does not demonstrate specific hazards of chronic exposure to electric fields, there are sufficient well-founded results demonstrating biological effects to require reasonable precautions. These precautions can be taken by limiting the electrical field at the edge of the right-of-way to 1.0 kV/m (BPA's proposed line has a maximum edge of right-of-way field strength of about 1.8 kV/m).

The research is not sufficiently advanced to determine a precise right-of-way edge criterion. The 1 kV/m limit was selected to take this uncertainty into account. The recommended limit is slightly lower than other "standards" or accepted practice elsewhere. For example, the New York Public Service Commission permitted construction of a 765-kV transmission line with a right-of-way restriction that effectively limits the electric field at the edge to 1.0 to 2.0 kV/m. The California Energy Commission recommends a 1.0 kV/m limit, but the New Jersey Department of Environmental Protection recommends 3.0 kV/m (USDOE 1982). Under ordinary circumstances, the electric field of a 365-kV line is also 1.0 to 2.0 kV/m at the edge of the right-of-way, and generally less for smaller lines. In the USSR, however, electric field-exposures of the general public are effectively limited to about 1.0 kV/m due to regulations prohibiting dwellings and recreational and work sites near 750-kV transmission lines (Sheppard 1983).

The 1.0 kV/m limit at the edge of the right-of-way can be achieved through the use of shield wires (wires suspended under the conductors) or by widening the right-of-way from the proposed 125 ft to 160 ft in areas where people spend substantial portions of time, such as residences, workplaces, or intensive recreational sites. A 160-ft right-of-way in residential areas or areas of moderate potential for future residential development could prevent development where the 1.0 kV/m limit would be exceeded. The additional right-of-way width applies to 7 miles of the Taft Route, or 29 acres of additional right-of-way. Installation of 7 miles of shield wires would be more expensive than acquiring easements across this much land.

MITIGATING NOISE EFFECTS

There are various ways to reduce the impact of transmission line noise. When only a few locations are severely affected, property purchases or cash settlements are a common solution. Existing residences could be avoided by centerline selection, so property purchase or other payment would not be necessary on the preferred route.

Reducing noise impacts would require a right-of-way 100 ft wider than that necessary for limiting the electrical field strength of the transmission line. Restricting the noise level to 50 dBA at the right-of-way edge would require a 265-ft-wide right-of-way, or the purchase of 118 additional acres of land on the Taft Route. Widening the right-of-way to reduce noise impacts would reduce the electrical field strength at the right-of-way edge to well below the 1.0 kV/m safety margin. Although transmission line noise 300 ft from the right-of-way edge would be audible, no one would be expected to be annoyed.

MITIGATING IMPACTS TO HONEYBEE HIVES

Impacts to beekeepers can be reduced by informing beekeepers along the centerline of the known effects of electrical fields on bees, and of the uncertainties involved, and by assisting beekeepers in relocating hives if necessary.

CHAPTER 6
ROUTE COMPARISONS

DNRC examined the three BPA routes (Hot Springs, Taft, and Plains) and the original Board-approved Jocko route. DNRC used much of BPA's data, the method used by DNRC to compare routes was independent of BPA's analysis. DNRC discussed the results of its analysis at a meeting with BPA in Helena in November 1982. The two agencies had agreed to reach a joint recommendation on a preferred route for the line. It was also necessary to rank the Taft, Plains, Hot Springs, and Jocko routes to satisfy the federal requirement that a contingency plan be available for federally-constructed projects. Following is a summary of the DNRC analysis comparing the various Taft alternatives with each other, and the entire Taft Route with the Hot Springs, Plains, and Jocko routes.

TAFT ROUTE CHARACTERISTICS

DNRC agrees with BPA that the best route for the proposed transmission line is a route from Garrison to Taft. The six Taft options discussed in this section differ only from Garrison to Miller Creek, all are the same west of Miller Creek to the Montana-Idaho border (see figure 8).

Table 9 summarizes the impact on each of these routes for each siting concern. There is little variation in overall impact risk scores among the six but each would affect different social environments and natural resources. Making tradeoffs to select a preferred route requires examining the specific impacts along each route.

Increased social impacts and decreased fish and wildlife impacts characterize the routes that cross the Drummond valley. Conversely, decreased social impacts and increased fish and wildlife and other natural resource impacts characterize the routes south of the valley. Social impacts decrease and natural systems impacts increase as routes move out of the valley into the higher terrain of the Flint Creek Range and John Long Mountains.

Four of the options cross Rock Creek, where transmission towers would pose a risk to low-flying planes. Rock Creek Canyon is an important flight corridor when Missoula and surrounding areas are fogged in, a common occurrence in winter. This hazard could be reduced by placing towers lower in the valley, requiring more access roads on steep slopes. The risk of slope instability and stream sedimentation would increase, as would impacts to recreation.

West of Miller Creek to the Montana-Idaho border, the Taft Route would create fewer social impacts, but again at the cost of increased impacts on wildlife, vegetation and fisheries. West of Miller Creek, 263 houses are within 2.0 mi of the proposed centerline and ten houses are within 0.25 mi. Agricultural impacts are low; this portion of the route crosses 3.0 mi of irrigated and nonirrigated agricultural land. Cultural resource impacts are low because the route avoids prehistoric and historic sites. This route crosses few intensive recreation sites, but extensive public land available for dispersed recreational use. Visual impacts to residences and intensive use recreation sites would be low because the route is distant from most residences and highways, and often screened from view by the landscape.

The Taft Route west of Miller Creek crosses the steepest terrain of any route, resulting in high erosion risk and a high potential for adversely affecting fisheries through siltation. Large amounts of big game summer security area and small amounts of big game winter range are crossed by this route. Construction would be difficult in the steep terrain and numerous difficult-to-build access roads would be needed resulting in extensive timber clearing.

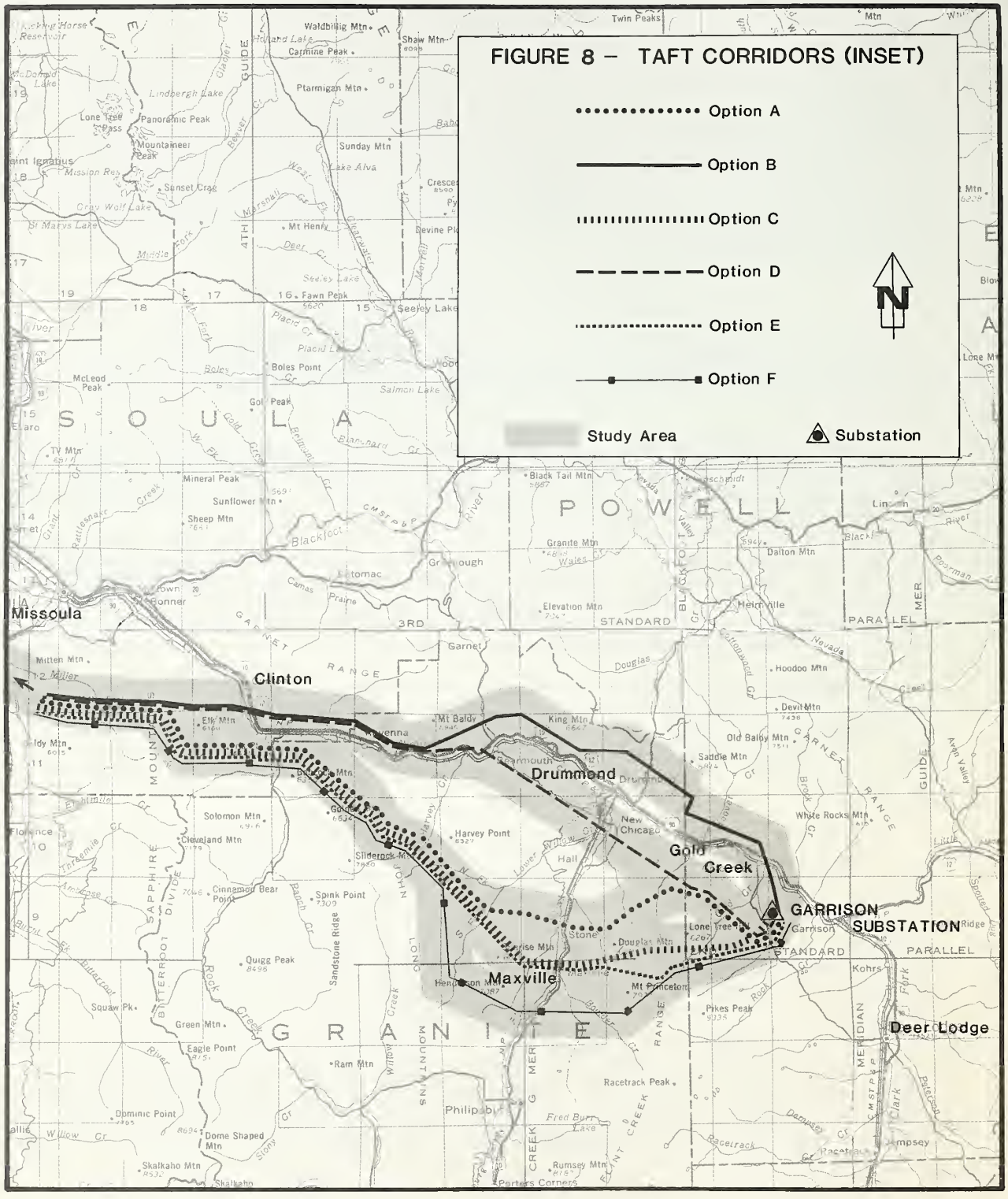


FIGURE 8 – TAFT CORRIDORS (INSET)
Option A
Option B
Option C
Option D
Option E
Option F
Study Area
Substation
N
Missoula
Clinton
Drummond
Gold Creek
GARRISON SUBSTATION
Maxville
Deer Lodge
Philipsburg
Garnet
Garnet Range
Sapphire Mountains
Flint Creek Range
Boulder Mtns.
Granite
Powell
Deer Lodge
Clark
Meridian
Principal
Baseline
Standard Parallel
3rd Standard Parallel

TABLE 9. POTENTIAL IMPACTS ON ALL TAFT ROUTE OPTIONS.

SITING CONCERN	TAFT ROUTE OPTIONS EAST OF MILLER CREEK OPTION A	OPTION B	OPTION C	OPTION D	OPTION E	OPTION F	TAFT ROUTE WEST OF MILLER CREEK
Socioeconomic/Aesthetic Impacts							
Number of Houses at Various Distances from Centerline							
in right-of-way (ROW)	0	0	0	0	0	0	0
ROW to 0.25 mi	3	10	6	10	8	0	10
0.25 to 0.50 mi	8	11	16	15	17	3	15
0.50 to 1.0 mi	11	33	8	37	12	10	40
1.0 to 2.0 mi	20	35	19	36	22	14	198
TOTAL	42	89	49	98	59	27	263
Conflict With Specially Managed Areas							
1. Airways							
Rock Creek Airway	x		x		x	x	
Bitterroot River Airway							x
Clark Fork Airway (crossings)		2		2			x
2. Recreation							
Blue Mountain Recreation							x
Rock Creek Recreational Waterway	x		x		x	x	
Lewis and Clark, and Stark Mtn. Trails							x
3. Tarkio Watersupply							x
Recreation/Aesthetic Impacts							
1. Recreation Area							
Beavertail Area		x		x			
Rock Creek Recreation Waterway	x		x		x	x	
Blue Mountain Recreation Area							x
Clinton Recreation Area		x		x			
2. Recreation Sites							
Bearmouth Chalet		x		x			
Campgrounds							2
Planned Dude Ranch			x		x	x	
3. Fishing Areas							
Fishing Access Sites		2		2			
High Value Fisheries	2		2		2	3	2
4. Rivers							
Bitterroot River							x
Clark Fork (crosses)		2		2			x
Clark Fork (parallels)		20 mi		20 mi			

TABLE 9 (cont.)

SITING CONCERN	OPTION A	OPTION B	OPTION C	OPTION D	OPTION E	OPTION F	TAFT ROUTE WEST OF MILLER CREEK
5. Highway 10A (scenic road)	x		x		x	x	
6. Camel's Hump Road							x
7. Trails							
Lewis and Clark							x
Stark Mountain							x
8. Rare II Areas	x		x		x	x	3
Effects on Terrestrial Ecosystems							
Mi of New Access Roads	148.2	121.7	173.2	84.6	209.4	183.3	293.7
Mi of Winter Range Crossed by ROW	18.6	42.6	14.1	30.6	15.9	15.6	31.4
Mi of Secure Summer Range	15.3	3.3	4.4	7.2	6.0	15.6	24.2
Mi of ROW Crossing Areas over 6,000 ft	5.2	2.3	12.2	2.3	22.8	21.5	2.5
Effects on Aquatic Ecosystems							
Mi of Streams per Erosion Risk Category of:							
high	7.0	11.8	13.0	5.0	15.8	15.5	71.5
medium	24.0	5.4	25.1	6.1	25.1	17.3	48.0
low	29.1	18.4	19.8	27.8	26.8	22.3	30.9
Number of Streams Crossed by ROW Per Erosion Risk Category of:							
high	3.0	1.0	6.0	0.0	7.0	4.0	10.0
medium	6.0	6.0	7.0	5.0	9.0	7.0	19.0
low	6.0	6.0	2.0	12.0	2.0	3.0	1.0
TOTAL New Access (in mi)	148.2	121.7	173.0	84.6	209.4	183.3	293.7
Cultural Resource Impacts							
Mi of High Impact Zone Crossed by ROW	7.2	4.0	3.6	7.1	3.1	5.5	3.7
Mi of Low Impact Zone Crossed by ROW	53.0	59.2	61.8	64.1	62.6	62.6	90.8
Land Productivity Impacts							
Mi of Irrigated or Prime Cropland Crossed by ROW*	1.0	2.9	0.3	9.5	0.3	0.0	1.6
Mi of Nonirrigated Cropland Crossed	0.0	0.1	0.0	2.3	0.0	0.0	1.4
Mi of Highly or Moderately Productive Forestland Crossed by ROW	32.6	10.5	37.0	11.7	36.1	36.6	80.9
TOTAL Mi of Timberland Crossed	41.6	31.0	54.2	32.5	55.9	59.3	90.0
Construction Constraints							
Mi of ROW Crossing Slopes 16-30 Percent	25.6	16.9	22.1	13.4	45.1	22.0	25.2
Mi of ROW Crossing Slopes > 30 Percent	23.6	37.3	33.0	26.5	32.9	38.7	58.9
Mi of ROW Crossing Problem Soils	7.3	7.8	2.4	3.8	2.5	1.2	11.1

TABLE 9 (cont.)

SITING CONCERN	OPTION A	OPTION B	OPTION C	OPTION D	OPTION E	OPTION F	TAFT ROUTE WEST OF MILLER CREEK
Residential Land Development Impacts							
Mi of Private Land with High or Moderate Residential Development	1	13	1	7	1	1	6
Construction Costs **							
Length of Route (mi)	65.2	64.2	65.4	71.1	65.7	67.8	93.4
Transmission Line Costs (millions)	$57.4	$52.3	$55.3	$48.6	$46.9	$62.4	$81.9
Substation and Associated Costs (millions)	-0-	-0-	-0-	-0-	-0-	-0-	$36.7

*This number represents the greater of the following quantities: presently irrigated land, farmland of statewide importance, designated prime or unique farmland.

**Figures based on BPA data for segment costs including tower steel and access roads.

TAFT ROUTE OPTIONS

OPTION A

Option A includes segments LRA-C, 135, 136, 128, and 138. The route goes southwest from the Garrison substation to the MPC 230-kV and 161-kV lines, paralleling them for about 4.5 mi. The route then turns west along the foothills of the Flint Creek Range south of Drummond and crosses Highway 10A about 1.0 mi north of Maxville. Turning northwest near Sunrise Mountain, the route crosses the John Long Mountains. South of Nimrod the route angles west, crossing Rock Creek 2.0 mi south of an emergency landing strip, Elliott airfield. After crossing Schwartz Creek 5.0 mi south of Clinton, this route turns north and then coincides with Options C, E, and F to the Miller Creek area.

DNRC developed Option A in an effort to reduce social impacts in the Maxville area. However, detailed mapping showed that this option would affect about as many residences as Option C; forty-two houses are within 2.0 mi and three are within 0.25 mi of the proposed centerline. Visual impacts to residences would be high. Agricultural impacts would be low because only 1.0 mi of irrigated and nonirrigated cropland is crossed. This route is close to extensive, high density historic and prehistoric sites. As is the case with other options, private and public land that could be used for recreation would sustain visual impacts. The route traverses 18.6 mi of big game winter range, 15.3 mi of secure summer habitat, and 5.2 mi of areas with elevations over 6,000 ft. Fifteen streams are crossed.

OPTION B

Option B composed of segments 101, 103, 104, 107, 108, 120, 121, 127, 128 and 138, heads north from the Garrison substation, crossing the Clark Fork and I-90 east of Gold Creek. This option roughly parallels I-90 along the Garnet Range north of Drummond to about 3.0 mi south of Clinton. It crosses both I-90 and the Clark Fork near Schwartz Creek and heads west to a point south of Miller Peak, about 5.0 mi south of Missoula. Option B was developed because it would go north of the Clark Fork and reduce impacts to fish and wildlife.

Option B reduces natural resource impacts at the cost of increasing social impacts. The terrain along this route is less steep than the southern routes and fewer streams are crossed, leading to a low level of erosion risk. This route crosses 42.6 mi of big game winter range, but 3.3 mi of big game secure summer habitat. Impacts to summer secure habitat are more difficult to mitigate. Eighty-nine residences lie within 2.0 mi of this proposed centerline, and ten within 0.25 mi of the line. The route crosses many intensive recreation sites. It parallels the Clark Fork and I-90 for 24.0 mi, twice crossing the river and I-90. This option would create more adverse visual impacts to residences and recreation sites, but would avoid the Rock Creek crossing.

OPTION C

Option C includes segments 118, 129, 130, 132, 134, 135, 136, 128, and 138. It proceeds southwest from Garrison, crossing MPC transmission lines about 1.0 mi from the substation, and then turns west through the north end of the Flint Creek Range, passing south of Jones Mountain. The route crosses Highway 10A at Maxville and then heads north to a point near Sunrise Mountain, where it coincides with Option A to Miller Creek.

Option C was examined to assess BPA's findings for its preferred route. It crosses 12.2 mi of steep terrain and fifteen streams, increasing the potential for erosion. This option crosses 4.4 mi of big game summer security areas. The route crosses more forested land than agricultural land, so more timbered areas would be cleared for the right-of-way and access roads.

A moderate number of residences would be affected: forty-nine houses within 2.0 mi and six houses within 0.25 mi of the reference centerline. Visual impacts to residences and the highway 10A crossing would be less than Option A since the opportunity for screening is greater. Several historic mining sites could be crossed, depending on centerline location.

OPTION D

Option D includes segments 118, 119, 121, 127, 128, and 138. Leaving the Garrison substation in a southwesterly direction, this option then turns northwest along MPC 230-kV and 161-kV lines and a vacant BPA right-of-way. It crosses the Drummond valley diagonally to a point 2.0 mi south of Bearmouth. Here it turns west and parallels the south side of I-90 and the Clark Fork to Dry Gulch and Nimrod. From this point it is the same as Option B to Miller Creek.

Option D was developed to explore the potential for reducing impacts by paralleling existing transmission lines. It is similar in advantages and disadvantages to Option B. It crosses relatively flat terrain and although seventeen streams are crossed, they are in the low erosion risk categories. It crosses half the summer security range that Option A would, although more winter range is traversed.

Option D crosses 11.8 mi of irrigated and nonirrigated cropland, and would interfere with farming and ranching operations more than any of the other six options. Ninety-eight houses could be affected by this route, making it the worst of the six options for social concerns. Few recreation sites are crossed, but visual impacts to these sites and the Clark Fork are high. Cultural resources would be adversely affected because the route crosses many prehistoric and historic sites.

OPTION E

Option E, composed of segments 118, 129, 131, 132, 134, 135, 136, 128, and 138, is similar to Option C. This option goes southwest from Garrison substation, crosses the MPC lines, and continues west southwest to a point near Rose Mountain, Gold Creek, and Rainbow lakes. This option joins Option C just east of the Highway 10A crossing at Maxville, and coincides with Option C to Miller Creek.

Option E crosses 22.8 mi of terrain with elevations over 6,000 ft as compared to 12.2 mi for Option C. Slightly more big game winter range and summer security habitat would be affected than on Option C. This option crosses about the same amount of forested land as Option C. Fifty-nine houses lie within 2.0 mi of the tentative centerline, and eight within 0.25 mi. This route would cause about the same impacts to cultural, recreation, and specially managed resources as Option C.

OPTION F

Option F includes segments 118, 129, LRA-B, 135, 136, 128, and 138. It parallels Option E from the Garrison substation, then turns south near Rose Mountain, crosses Boulder Creek and continues west, crossing Highway 10A and Flint Creek about 5.0 mi south of Maxville. Near Sawmill Creek it crosses the South Fork of Copper Creek. It joins Options A, C, and E near McLean Creek, 2.5 mi west of Henderson Mountain.

TABLE 10. EFFECT OF ALTERED WEIGHTS OF CERTAIN SITING CONCERNS FOR TAFT ROUTES EAST OF MILLER CREEK

CASE 1. The weight of the socioeconomic siting concern was increased from 8.17 up to 20. All other weights were held constant. This reversed the rankings of Options B and F at a weight of 20. Option C remained preferred.

SOCIOECONOMIC	8.17	9	10	12	14	16	20
	C	C	C	C	C	C	C
	E	E	E	E	E	E	E
	A	A	A	A	A	A	A
	B	B	B	B	B	B	F
	F	F	F	F	F	F	B
	D	D	D	D	D	D	D

CASE 2. The weight of the socioeconomic siting concern was changed from a weight of 8.17 down to 2. All other weights were held constant. Option D ranked better than Option F for weightings less than or equal to 5.

SOCIOECONOMIC	8.17	7	6	5	4	3	2
	C	C	C	C	C	C	C
	E	E	E	E	E	E	E
	A	A	A	A	A	A	A
	B	B	B	B	B	B	B
	F	F	F	D	D	D	D
	D	D	D	F	F	F	F

CASE 3. The weight for the recreation siting concern was changed from a weight of 7.63 down to 3. All other weights were held constant. This resulted in a higher ranking for Options D and B and a lower ranking for Options E, A, and F. Option C remained the preferred.

RECREATION	7.63	6	5	4	3
	C	C	C	C	C
	E	E	E	E	B
	A	A	B	B	E
	B	B	A	A	D
	F	D	D	D	A
	D	F	F	F	F

CASE 4. The weights for the socioeconomic and recreation siting concerns were reduced togother. All other weights were held constant. This resulted in a higher ranking for Options D and B, and a lower ranking for Options F, A, E, and C. Option B supplants Option C as the preferred choice.

SOCIOECONOMIC	8.17	7	6	5	4	3
RECREATION	7.63	6	5	4	3	2
	C	C	C	C	C	B
	E	E	E	E	B	C
	A	A	B	B	E	D
	B	B	A	A	D	E
	F	D	D	D	A	A
	D	F	F	F	F	F

CASE 5. The weight for the aquatic, terrestrial, and land productivity siting concerns were increased together. All other weights were held constant. This resulted in higher rankings for Options D and B, and lower rankings for Options F and A. Option C remained preferred.

AQUATIC	5.00	6	7	8	9	9	7
TERRESTRIAL	5.54	7	8	9	10	10	8
LAND PRODUCT.	2.08	2.08	2.08	2.08	2.08	4	4
	C	C	C	C	C	C	C
	E	E	E	E	E	E	E
	A	A	A	A	A	B	A
	B	B	B	B	B	A	B
	F	D	D	D	D	D	D
	D	F	F	F	F	F	F

Option F was suggested by the Granite County Alliance, a citizens' group, as a locally preferred way of routing the transmission line around the communities of Maxville and Hall. Option F would have the least impact on residences and agriculture of the six routes. No residences are within 0.25 mi of the centerline, and only twenty-seven are within 2.0 mi of the centerline.

Although Option F avoids intrusions on residences and private lands, it traverses fourteen streams and 21.5 mi of the route is over 6,000 ft. This route has high access road requirements, and crosses the most secure summer range. The route would cause the worst impacts on timber productivity and cultural resources, and it is the most costly option.

ANALYSES OF TAFT ROUTE OPTIONS

DNRC experimented to determine how a change in siting concern importance affected the ranking of the six Taft route options. Table 10 summarizes the results of this mathematical route evaluation. The ranking of the routes changed only slightly with different weights assigned to selected siting concerns. Option A would affect about the same number of residences as the highest-ranking Option C, but would increase potential impacts to natural resources. Option B has more impacts to residences but would reduce potential impacts to wildlife. Options A and B were DNRC's preferred route options east of Miller Creek. Options D and F were eliminated from analysis on the basis of their consistently low rankings. Option E shares the same four-mile corridor as Option C but offers more of Option C's advantages.

In November 1982, DNRC and BPA jointly considered the advantages and disadvantages of options A, B, and C to find a preferred route through the Drummond valley. This discussion is summarized in Appendix C. Options B and C were considered the most feasible routes through the Drummond valley. Option C was jointly selected as first choice because it would cause few social and recreational impacts. Option B would cause fewer impacts to aquatic and terrestrial ecosystems but more impacts to residences. Option B was selected as the second best route to achieve more of a balance between social impacts and impacts to natural resources.

DNRC and BPA agreed that Option C would provide the most flexibility for siting the transmission line from Garrison to Miller Creek. DNRC and BPA acknowledge that centerline adjustments within a 4.0-mi-wide corridor will be necessary to reduce residential impacts.

DNRC and BPA agreed that if Option C and the remainder of the Taft Route were chosen, every effort should be made to mitigate impacts to natural resources, which would be greater for this route than for others. Mitigating measures were central to DNRC and BPA in choosing the Taft Route, and the measures jointly recommended for adoption by the Board are presented in chapter 7.

COMPARISON OF THE PLAINS, HOT SPRINGS AND JOCKO ROUTES

The Plains, Hot Springs, and Jocko routes were evaluated by DNRC. Table 11 lists each route and the siting concerns used to evaluate them. Appendix C shows the segments composing DNRC's Plains and Hot Springs routes as opposed to the segments composing BPA's Plains and Hot Springs routes. The appendix also contains a ranking of the Taft, Plains and Hot Springs routes. DNRC considers the Plains, Hot Springs, and Jocko routes to have far more potential for adverse social impacts than any Taft route studied.

TABLE 11. COMPARISON OF THE TAFT SOUTH, TAFT NORTH, PLAINS, HOT SPRINGS, AND JOCKO ROUTES

SITING CONCERN	TAFT SOUTH	TAFT NORTH	PLAINS	HOT SPRINGS	JOCKO
Socioeconomic/Aesthetic Impacts					
Numbers of Houses at Various Distances from Centerline					
in right-of-way (ROW)	0	0	0	2	0
ROW to 0.25 mi	16	20	55	130	73
between 0.25 and 0.50 mi	31	26	64	180	88
between 0.50 and 1.0 mi	48	73	99	496	215
between 1.0 and 2.0 mi	217	233	754	1201	1064
TOTAL	312	352	972	2009	1440
Conflict With Specially Managed Areas					
1. Airways					
Bitterroot Airway	x	x	x		
Clark Fork Airway	x	x	x	2	2
Flathead River Airway			x	x	x
Rock Creek Airway	x	x	x		
2. Recreation Areas					
Blue Mountain Recreation Area	x	x	x		
Rock Creek Recreational Waterway	x	x	x		
3. Trails					
Lewis and Clark	x	x			
Stark Mountain	x	x			
4. Blackfoot-Clearwater Game Range					x
5. Thompson Falls Airport			x	x	x
6. Tarkio Watershed	x	x			
Recreation/Aesthetics Impacts					
1. Recreation Areas					
Rock Creek Waterway	x	x	x		
Clinton		x			
Planned Dude Ranch	x		x		
Blue Mountain	x	x	x		
Bearmouth Chalet		x			
Lions Campground			x	x	x
2. Rivers					
Bitterroot	x	x	x		
Blackfoot				x	x
Flathead			x	x	x
Thompson			x	x	x
Clark Fork (crossings)	x	3	3	3	3
Clark Fork (parallels)		20 mi	12 mi	12 mi	12 mi

TABLE 11 (cont.)

SITING CONCERN	TAFT SOUTH	TAFT NORTH	PLAINS	HOT SPRINGS	JOCKO
3. Fishing Sites					
High-value fishery	4	2	Ninemile Drainage		2
Fishing access		2			
4. Lewis and Clark Trail	x	x	x	x	
5. National Bison Range				x	x
6. Tribal Sacred Area					x
7. Lakes					
Placid					x
Salmon					x
Rainbow				x	x
8. Highway 10A	x		x		
9. Amount of Public Dispersed Recreation Lands Crossed	138 mi	116 mi	136 mi	67 mi	59 mi
Effects on Terrestrial Ecosystems					
Mi of New Access Required	466.9	415.4	401.5	323.5	243.0
Mi of Winter Range Crossed by ROW	45.5	74.0	78.2	71.9	64.0
Mi of Secure Summer Range Crossed by ROW	28.6	27.5	18.4	19.4	25.4
Mi of ROW Crossing Areas Over 6,000 ft	14.7	4.8	8.2	6.4	0.0
Effects on Aquatic Ecosystems					
Mi of Streams in Erosion Risk Category					
high	84.5	83.3	83.2	50.3	37.0
medium	73.1	53.4	34.5	28.2	16.8
low	50.7	79.3	117.3	136.2	123.4
Number of Streams Crossed by ROW in Erosion Risk Category					
high	16.0	11.0	12.0	7.0	5.0
medium	26.0	25.0	17.0	8.0	3.0
low	3.0	7.0	27.0	28.0	22.0
TOTAL New Access Required (in mi)	466.9	415.4	401.5	323.5	243.0
Cultural Resource Impacts					
Mi of ROW Crossing High Impact Zone	7.3	7.7	15.6	12.9	14.3
Mi of ROW Crossing Low Impact Zone	152.6	150.0	163.2	175.7	156.7
Land Productivity Impacts					
Mi of Irrigated or Prime Cropland Crossed*	2.6	4.5	5.8	13.3	16.5
Mi of Nonirrigated Cropland Crossed	1.4	1.5	17.6	26.2	20.1
Mi of Highly and Moderately Productive Timberland	113.5	91.4	118.0	73.1	101.3

TABLE 11 (cont.)

SITING CONCERN	TAFT SOUTH	TAFT NORTH	PLAINS	HOT SPRINGS	JOCKO
Construction Constraints					
Mi of ROW Crossing Slopes 16-30 Percent	13.5	18.9	17.1	38.5	27.8
Mi of ROW Crossing Slopes > 30 Percent	91.9	96.2	73.3	48.0	43.4
Mi of ROW Crossing Problem Soils	47.3	42.1	55.4	64.6	35.9
Residential Land Development Impacts					
Mi of Private Land with High or Moderate Residential Development	7.0	19.0	22.0	84.0	46.0
Construction Cost**					
Length of Line in Montana (in Mi)	158.8	157.6	173.9	177.4	171.4
Transmission Line Cost (millions)	$137.2	$134.2	$140.4	$127.4	$140.7
Substation and Associated Costs in Montana (millions)	$ 36.7	$ 36.7	$ 30.4	$ 29.0	$ 29.0
TOTAL Project Costs from Garrison, MT to Bell, WA	$222.1	$219.1	$212.2	$200.9	$214.2***

*This number represents the greater of the following quantities: presently irrigated land, farmland of statewide importance, and designated prime or unique farmland in Montana.

**Figures based on BPA data for segment costs including tower steel and access roads.

***Cost figures developed by DNRC using slope break categories and BPA cost estimates without overhead as listed below. This figure also assumes BPA estimates of substation costs at Hot Springs and Bell substations and transmission line costs from Hot Springs west to Bell. Slope break categories were:

Slopes of 0-15 percent--43.8 mi x $646,000/mi
Slopes of 15-30 percent--22.5 mi x $693,000/mi
Slopes of > 30 percent--23.3 mi x $766,000/mi

THE PLAINS ROUTES

The DNRC Plains Route is composed of segments 118, 129, 130, 132, 134, 135, 137, 138, 139, 142, 144, 147, 148, 14, 18, and 22. This route is the same as the DNRC-preferred Taft Option C to Frenchtown, where it turns north-northwest along the west side of Ninemile Creek drainage and passes 3.0 mi east of Paradise. About 5.0 mi north of Plains the route turns northwest paralleling the Clark Fork to a point 3.0 mi east of Thompson Falls. The route then angles west and crosses the river and highway south of Driveway Peak, going into Idaho over Thompson Pass.

This route differs greatly from the Plains Route proposed in BPA's draft EIS. DNRC modified the route to take advantage of Taft Option C. The Plains Route was not preferred for any siting concern. It has the greatest potential for damaging streams and rivers, especially high quality streams in the Ninemile drainage. About 18.4 mi of big game summer security areas are crossed. The route crosses numerous historical and archaeological sites, and could conflict with private land development near Alberton and along the Clark Fork. The Plains Route would affect three times as many residences as would the preferred Taft Route. Plains has fifty-five residences within 0.25 mi and 972 residences within 2.0 mi of the proposed centerline. More intensive use recreation sites lie near this route than the Taft alternative. This route crosses 23.4 mi of irrigated and nonirrigated agricultural cropland.

THE HOT SPRINGS ROUTE

DNRC's Hot Springs Route is composed of segments 101, 103, 104, 107, 108, 109, 110, 111, 113, 115, 116, 117, 5, 16, 18, and 22. This route differs from BPA's Hot Springs Route only in DNRC's substitution of segments 103 and 104 for BPA's segment 102. Segments 103 and 104 have lower wildlife and aquatic impact risk for the area north of Gold Creek.

The Hot Springs Route scored consistently higher in overall potential impact risk than the Plains and Taft routes. It would affect the most people; 130 houses lie within 0.25 mi of the proposed centerline, 2,009 houses within 2.0 mi of the proposed centerline and two houses are in the proposed right-of-way. Farming practices would also be affected, 39.5 mi of irrigated and nonirrigated cropland is crossed. It is believed that many cultural resource sites are on the Flathead Indian Reservation, and could be crossed by this route. A great number of recreation resources would be affected by this route.

The Hot Springs Route poses low impact risk to natural systems, the route crosses gentle topography and few streams, reducing the risk of adversely affecting fish populations. Fewer access roads would be required, no areas over 6,000 ft would be traversed. Less secure summer habitat would be affected than on the Taft routes, while more winter range would be crossed. Fewer trees would be cut in clearing and survey operations than on any other route, in part because it parallels an existing transmission line right-of-way for most of the way.

THE JOCKO ROUTE

The Jocko Route is composed of segments 5A, 5B, 16, 18, and 22. DNRC examined the portion of this route from Garrison to Ovando. The route from Ovando to Hot Springs was approved by the Board in 1976. This route coincides with BPA's Hot Springs Route from the Hot Springs substation to the Montana-Idaho border.

BPA's proposed Hot Springs Route and DNRC's Jocko Route have many of the same advantages and disadvantages. Both parallel transmission lines in the Clark Fork Valley for most of their length. Valleys provide ease of access but are usually veavily inhabited, and siting the transmission line there would affect people.

In western Montana valleys, there is much privately-owned land, and most big game habitat crossed is winter range which is easier to mitigate. Therefore, a valley route paralleling existing transmission lines tends to minimize the potential for adversely affecting big game but increases impacts on people.

The proposed centerline for the Jocko Route lies within 0.25 mi of seventy-three houses (half the number affected by the Hot Springs route); 1,440 houses are within 2.0 mi of the proposed centerline, or about one and a half times more houses than on the Plains Route. This route crosses 36.6 mi of irrigated and nonirrigated agricultural land, and farming could be affected more than on any other route. The Jocko Route would cross the Flathead Reservation, adversely affecting cultural sites, and the Tribal Sacred Area. The route crosses Placid Creek, the Middle Fork of the Jocko River, and the Little Bitterroot River. Discovery of cultural resource sites is projected for these areas.

Cultural resource impacts would be severe, especially in the Tribal Sacred Area, which is closed to nontribal members. The Executive Secretary of the Confederated Salish and Kootenai Tribal Council said in a letter to DNRC that the Tribal Sacred Area would be an unacceptable location for the line because of the area's religious values (see Appendix A). DNRC sought clarification of the Tribes' position on a route that would cross the reservation but avoid the Tribal Sacred Area, but has received no response.

Few impacts to land, water and other natural resources would occur on the Jocko Route. The route traverses gentle topography, but does encounter problem soils which would moderately constrain construction. The Jocko Route crosses the Clearwater Game Range and the Nevada Creek valley, an area with numerous lakes, small prairie potholes, and perennial streams. These areas provide nesting sites and migration corridors for waterfowl that might strike the transmission line. The Jocko Route is roughly equal to the Hot Springs Route in impacts to most wildlife, but the Jocko Route poses the greatest risk to grizzly habitat and denning sites in the Jocko Pass area and to Howell's gumweed, a rare plant. The route's elevation is generally under 6,000 ft and it would require the fewest new access roads. Less timber clearing would occur than on the Taft or Plains routes.

The Jocko Route crosses or is adjacent areas used extensively for recreation (see table 6), including the Tribal Sacred Area, the Mission Mountain Tribal Wilderness, and the Blackfoot River Conservation and Recreation Corridor. The route could adversely affect homes from St. Ignatius west to Hot Springs, many of which were built in the mid and late 1970s. Seventy-four residences are within 0.25 mi and 1,440 within 2.0 mi of the proposed centerline. Agricultural impacts along the route would be severe. The route bisects the south part of the Flathead and the north part of the Jocko River valleys which are irrigated mechanically or by flooding.

CHAPTER 7
RECOMMENDATIONS

The following draft recommendations are submitted to the Board of Natural Resources and Conservation. These recommendations and any modifications to them will be published in a final addendum to the Board in April 1983. The final addendum will report the public comment received on the recommendations and describe how they will be implemented or responded to. Some recommendations were developed by a BPA-DNRC interagency team and others are recommended by DNRC to ensure BPA compliance with the MFSA standards.

INTERAGENCY RECOMMENDATIONS

ROUTE

DNRC and BPA both chose to recommend the Taft South Route as the best option, with the Taft North Route as the second choice. The agencies further recommend that in the event neither of these routes could be used, the interagency team would reconvene to evaluate other routes.

WILDLIFE

A cooperative interdisciplinary federal/state study team funded by BPA should be formed to determine methods for reducing potential impacts to wildlife. The study should focus on (1) location standards and management of access roads in important wildlife habitat, (2) timing construction to reduce impacts to wildlife, (3) evaluating tower placement in important wildlife habitat, (4) evaluating the feasibility and necessity of compensating for lost wildlife security and/or habitat, (5) developing a program to monitor the implementation of mitigating measures, and (6) evaluating the effectiveness of the measures in reducing impacts to natural resources.

SCENIC IMPACTS

There should be a cooperative federal/state review of project mitigation plans to select and determine the effectiveness of visual impact reduction measures. This review would: (1) determine whether to designate additional sections of the route for tower darkening, (2) identify potential centerline or tower placements to reduce visual impacts, and (3) monitor the effectiveness of the measures.

ROADS

A cooperative team of state and federal resource specialists should review project mitigation plans to determine the feasibility of reducing new access road construction and to recommend closing of access roads to protect wildlife, visual values, and other resources.

WORKER IMPACTS ON COMMUNITIES

At least 30 days before the start of construction, BPA representatives and the construction contractor should meet with local officials to discuss the effects of temporary increases in population in their communities. Such effects would result from the need to provide housing and public services (such as police and fire protection and garbage collection) for workers and their families. This action is intended to reduce community concerns about construction period impacts and provide time and information to prepare for anticipated stresses on local services.

MAINTENANCE AND REPAIR

BPA will work with landowners to maintain and repair cattle guards, fences, and gates installed by BPA.

CHOICE OF INSULATORS

BPA should examine the feasibility of using insulator colors other than bottle green to reduce visual impacts.

RIGHT-OF-WAY NEAR FUTURE RESIDENCES

BPA should work with city/county planning agencies to reduce potential for future land use conflicts along the right-of-way, and should seek to discourage land uses that would preclude future use of the right-of-way for other utility lines.

WASHINGTON WATER POWER PLANS

BPA's draft EIS evaluated a proposal by Washington Water Power (WWP) to reinforce electrical supply in Idaho by tapping into the substation at Plains, Hot Springs, or Taft. If WWP proposes to build a single-circuit 230-kV transmission line on steel towers from the substation, it should coordinate with BPA on tower design and spacing, right-of-way clearing, and access road construction to reduce potential impacts.

ADDITIONAL RECOMMENDATIONS PROPOSED BY DNRC

RECOMMENDATION 1

On private land where proposed centerline locations are unsatisfactory to local residents or affected landowners, BPA should fund a centerline study team of local residents and representatives from DNRC, BPA, and USFS to identify a mutually acceptable centerline.

RECOMMENDATION 2

DNRC's construction standards, as amended, (appendix B) should be followed for the route from Garrison to the Montana-Idaho border, particularly standards that are more stringent than measures proposed by BPA or required by USFS and BLM.

RECOMMENDATION 3

BPA should fund a state construction monitoring program as required by MFSA. The program should be designed to monitor compliance with construction standards and other requirements stipulated by the Board in approving the route.

RECOMMENDATION 4

DNRC recommends a 1.0 kV/m limit for electric field strength at the right-of-way edge in residential and subdividable areas. This limit would provide an adequate margin of safety to protect public health.

DNRC further recommends that widening the 125-ft right-of-way in residential and subdividable areas to 265 ft would limit transmission line noise to 50 dBA at the right-of-way edge. Seven miles of the proposed route would require the wider right-of-way. Designation of a 265 ft right-of-way in residential or subdividable areas would require BPA to acquire easements for an additional 118 acres. The 265 ft right-of-way would achieve the 1.0 kV/m electric field level and the 50 dBA noise level.

RECOMMENDATION 5

All beekeepers along the selected route should be informed of the known and suspected effects of electrical fields on bees, assisted in relocating hives if necessary, and reimbursed for cash losses due to the line's adverse effects on honey production.

RECOMMENDATION 6

DNRC recommends that radio and TV interference problems resulting from construction or operation of the transmission line be resolved by BPA. Corrective measures could include mechanical corrections to insulators and TV antennas and installation of remote antennas or repeater stations.

RECOMMENDATION 7

To reduce impacts on cultural resources, DNRC recommends adherence to the Montana State Historic Preservation Office recommendations, the Historic Preservation Act mandates, and to the recommendations of the Advisory Council on Historic Preservation.

RECOMMENDATION 8

DNRC recommends that location plans for access roads be reviewed to reduce risk of erosion and ground disturbance, especially when there are stream crossings on steep slopes and in areas of problem soils. Coordination with DFWP regarding road construction and maintenance practices could help preserve wildlife habitat, and reduce erosion risk and impacts to streams.

RECOMMENDATION 9

DNRC recommends that BPA control noxious weeds with biological means to the extent possible in Montana, and use chemical herbicides that are harmless to nontarget plant species where appropriate.

RECOMMENDATION 10

BPA should designate a liaison to resolve landowner complaints. BPA has said that landowner complaints during the construction period (about easements or construction practices) should be made to the Land Liaison in BPA's Transmission Coordination Office in Missoula, phone 329-3737. After construction, all complaints should be directed to BPA's District Office in Missoula, phone 329-3860.

RECOMMENDATION 11

DNRC recommends that BPA locate towers and access roads along fence sections or property lines to the extent possible.

RECOMMENDATION 12

DNRC recommends that BPA work with local governments and private landowners to minimize duplication of effort in controlling weeds along right-of-ways and access roads. Weed control costs associated with this project, especially on state and privately owned land, should be charged to BPA, not to the landowner.

RESOLUTIONS

RESOLUTION 1

The Board should consider recommending that BPA reimburse local governments for all expenses due to construction, operation, and maintenance of the transmission line. A broader interpretation of impact aid to include indirect services such as those provided by city police is needed. BPA representatives should stay in close communication with local officials to determine impact aid requirements. As now stipulated, BPA would require local government units to demonstrate expenditures of at least $1,000 in providing direct services as a result of the powerline. If a local government could not document $1,000 in actual costs, it would not qualify for impact aid.

RESOLUTION 2

The Board should consider recommending that Montana's Congressional delegation introduce legislation that would allow BPA and other federal power marketing agencies to make payments in lieu of taxes.

RESOLUTION 3

The Board should consider recommending that BPA encourage its contractors to hire as many local workers as possible.

APPENDIX A

CORRESPONDENCE

THE CONFEDERATED SALISH AND KOOTENAI TRIBES
OF THE FLATHEAD RESERVATION

Box 278
Pablo, Montana 59855
(406) 675-2700

FLATHEAD NATION

Fred Houle, Jr. - Executive Secretary
Vern L. Clairmont - Executive Treasurer
Baptiste McDonald - Sergeant-at-Arms

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MONT. DEPT. of NATURAL RESOURCES & CONSERVATION

September 16, 1982

TRIBAL COUNCIL MEMBERS
Thomas E. Pablo - Chairman
Joseph "Joe Dog" Felsman - Vice-Chairman
Victor L. Stinger - Tribal Secretary
Robert L. McCrea - Tribal Treasurer

Al Hewankorn
John McClure
E.W. Mongeau
Sonny Mongeau
Noel Pichette
James H. Steele

Mr. Leo Berry, Director
Department of Natural Resources & Conservation
32 South Ewing
Helena MT 59620

Dear Mr. Berry:

Your letter of August 25, 1982 inquired about the Tribes position regarding the potential acceptability of siting Bonneville Power Administration's 500 kv transmission line across the Flathead Reservation, following either of the alternative routes to Hot Springs, or any other route that might be acceptable.

It is the position of the Tribes that they will not permit the lines to cross the Reservation because they would cross the area of Tribal land designated as the "Jocko Primitive Area". The Jocko Primitive Area was modeled on areas established by Federal Law pursuant to the National Wilderness Preservation Systems Act, 16 U.S.C. Section 131, et seq. Reference to that Act will show that it would be a violation of wilderness policy to construct the transmission lines in the Jocko Primitive Area. The area is set aside for future generations of Tribal Members, a minuscule remnant of the Tribes once lush, unspoiled Reservation. In addition, because of the diminishing stock of wildlife on the Reservation, a natural resource preserved exclusive for the Tribe by the Treaty of Hellgate, the Tribes are opposed generally to the lines crossing the Reservation.

And, as you are well aware, the Tribes dispute that Bonneville has the authority to expand the existing 230 kv right of way to one supporting two 500 kv lines, even though the right of way may not be expanded physically.

We would be glad to cooperate with your Department's efforts to gather environmental, land use, and cultural data for the Jocko corridor. We cannot, however, allow State employees to enter into the Jocko Primitive Area. We feel they can adequately view the area from the Jocko pass. Our Cultural Committee and other members of the Tribes and Officials will be happy to discuss this policy with you.

If you have further questions, please call.

Sincerely yours,

CONFEDERATED SALISH AND KOOTENAI TRIBES

Fred Houle, Jr.
Executive Secretary

xc: Richard Baenen
Evelyn Stevenson

United States Department of the Interior
FISH AND WILDLIFE SERVICE

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MONT. DEPT. OF NATURAL RESOURCES & CONSERVATION

Mr. Bob Robinson
Administrator
Energy Division
Montana Department of Natural Resources
and Conservation
32 South Ewing
Helena, Montana 59601

Dear Mr. Robinson:

It has come to my attention that the Montana Department of Natural Resources and Conservation (MDNRC) is reviewing an alternate route--the Jocko Route--for the Garrison-Spokane 500 KV Transmission Line Project.

Three issues of major concern to the Fish and Wildlife Service (FWS) from this route are Endangered Species, bird collisions, and FWS owned lands.

Endangered Species

Consideration of the Jocko Route requires reevaluation of the line's impact upon Federally-listed endangered and threatened species. The Bonneville Power Administration (BPA) is the Federal agency responsible for meeting Section 7 responsibilities under the Endangered Species Act for the Garrison-Spokane Transmission Line Project. They have prepared biological assessments pursuant to Section 7(c) of the Endangered Species Act for the Garrison-Missoula and Missoula-Spokane portions of the project in which they concluded that the project following these routes would have no effect on endangered and threatened species. The FWS has concurred with these determinations.

Should the Jocko Route be selected, another biological assessment for endangered and threatened species would have to be prepared to determine if the project, following the Jocko Route, would affect listed species. If a "may affect" determination is made, formal consultation with the FWS pursuant to Section 7 of the Endangered Species Act would have to be initiated by BPA.

The following information on endangered species may help you in your evaluation of the Jocko Route. The endangered bald eagle and peregrine falcon and threatened grizzly bear may occur in areas impacted by the Jocko Route. The Jocko Route crosses both the Blackfoot River and Flathead River in areas where bald eagles

winter. There also are known active bald eagle nests in the vicinity of the Blackfoot River crossing. Peregrine falcons may migrate through the areas impacted by the line although we are not aware of any active eyrie sites. The project should be evaluated and designed to:

1. Maintain the physical suitability of nesting territories as bald eagle and peregrine nesting habitat.

2. Prevent disturbances which could cause nest failure.

3. Minimize human actions which prevent eagles/peregrines from using feeding areas.

4. Give consideration to ensuring adequate and uncontaminated food supplies.

5. Avoid disturbing or physically altering bald eagle communal roosting and staging areas.

The Jocko Route also crosses occupied grizzly bear habitat in the Southern Mission Mountains. The route should be evaluated for its effect on important grizzly bear habitat components and grizzly use of them particularly during the critical spring (April-July) and fall periods (October-November). These habitat components include:

1. Avalanche chutes
2. Sidehill parks
3. Shrubfields
4. Ungulate winter ranges
5. Den sites
6. Riparian zone/Hydric sites
7. Wet meadows
8. Alpine meadows
9. Slabrock/alpine scree
10. Whitebark pine/limber pine covertypes
11. Space.

In your evaluation, you should pay particular attention to the project's potential to increase grizzly bear-human confrontations primarily through increased road access, colocation of project workers and grizzlies, in important grizzly bear habitat during critical bear use periods, and providing bear attractants through improper disposal and storage of garbage, food, and other organic materials.

If you need additional information or have questions regarding endangered and threatened species, please contact Wayne Brewster, Field Supervisor, Endangered Species, Billings, Montana, or a member of his staff at 657-6059 (FTS 585-6059).

Bird Collisions

The proposed route would involve a crossing of the Flathead River. The river in that area is used each fall by up to 3,000 Canada Geese, and 10,000 mallards. There is a potential for waterfowl mortality from bird collisions with the powerline. Possible mitigation measures which could be taken to reduce this hazard should be investigated in studies of this proposed route.

FWS Lands

The Jocko Route as planned would cross the northeast corner of the National Bison Range (NBR). The 500 KV powerline would be incompatible with the purposes of the National Wildlife Refuge because of adverse visual impact on the natural setting. The powerline and support structures would detract from the value of the enjoyment experienced by approximately 100,000 visitors annually, about two-thirds of whom drive our 19-mile scenic auto tour. Even if built just north of the NBR, the line would affect the quality of the tour experience by marring the view of the Mission Valley from High Point on the NBR.

For additional information, please contact Jon M. Malcolm, Refuge Manager, National Bison Range, Moiese, Montana, (406) 644-2354.

Because of potential bird collision problems and impacts to the NBR, the FWS recommends that an alternate route be selected which would have less impact on bird mortality and FWS lands.

Sincerely,

Acting Regional Director

cc: Refuge Manager, National Bison Range,
FWS, Moiese, Montana
Field Supervisor, Ecological Services,
FWS, Billings, Montana
Field Supervisor, Endangered Species,
FWS, Billings, Montana
Bonneville Power Administration, Portland, Oregon
Attention: Timothy J. Murray

DEPARTMENT OF COMMERCE
AERONAUTICS DIVISION

TED SCHWINDEN, GOVERNOR

P.O. BOX 5178
2630 AIRPORT ROAD

STATE OF MONTANA

(406) 449-2506

HELENA, MONTANA 59604

November 18, 1982

Mr. Robert Robinson,
Deputy Director
Department Natural Resources
1424 9th Avenue
Helena, MT 59601

Dear Mr. Robinson:

As per your request of November 17, 1982, we have reviewed your chart depicting the proposed routes for the BPA power transmission lines from Garrison West to the Idaho border.

We wish to reiterate our strong concern regarding the proposed Rock Creek Canyon crossing. This extreme aviation hazard could be eliminated and made acceptable by crossing on the canyon floor or to use the proposed alternate route.

Rock Creek Canyon is an important aerial navigation route from the Bitter Root Valley Eastbound, and the only possible VFR Route during times of low cloud cover in the Bitter Root Valley. This is the lowest possible route across the Sapphire Mountains and terminates at the Rock Creek emergency airport which is located immediately North of the mouth of Rock Creek Canyon. Any lines crossing the Rock Creek Canyon, other than lines placed in such a way that there are no long spans nor wires higher than 200' AGL at the highest point, would constitute an unacceptable hazard to aerial navigation during periods of time when cloud cover make this the only safe VFR Route East from Western Montana.

Following is a list of areas depicted on the chart which we feel could be hazardous to aerial navigation:

AN EQUAL OPPORTUNITY EMPLOYER

BPA - GARRISON WEST

HAZARDOUS LOCATIONS

1. Crossing at Gold Creek
2. Crossing South of Clinton
3. Crossing North of Lolo
4. Crossing at Nine Mile
5. Dixon
6. East of Paradise *
7. Northwest of Plains
8. Mullen Pass Area - VOR
9. 12-Mile Creek *

EXTREME HAZARDS

1. Rock Creek Canyon
2. Evaro Hill
3. Thompson Falls (Hwy., River, RR, near Airport)
4. Crossing Clark Fork (Northeast St. Regis)

* Unclear on chart depicting proposed routes as to whether or not these are in addition to river, rail, or highway, also canyon or pass crossings.

Inasmuch as it is not clear on the chart how the power lines will cross at the above listed areas of concern, it is felt that each area needs to be specifically addressed.

Your cooperation and concern for flight safety is recognized and very much appreciated.

Sincerely,

Michael D. Ferguson

Michael D. Ferguson, Administrator
Aeronautics Division

cc: Gary Buchanan, Director
Department of Commerce

Dave Jones - FAA, Seattle

APPENDIX E

CONSTRUCTION STANDARDS

The construction standards adopted by the Board for the Townsend to Garrison portion of the 500-kV transmission line have been amended in Sections 14 and 17. DNRC recommends adoption of the amended standards for the segment of the line from Garrison West.

CONSTRUCTION STANDARDS FOR 500-kV
GARRISON TO SPOKANE TRANSMISSION LINE
Amended February 1983

DEFINITIONS

BPA: Bonneville Power Administration

CONTRACTOR: Constructors of the Facility

0.0 GENERAL

Construction of the 500-kV line shall require good construction practices reflecting the landowners' needs, environmental impacts, economics and engineering considerations. These guidelines for construction shall become part of the Contract with the successful bidder, and shall include the following: (1) general standards for CONTRACTOR performance; (2) planning and coordination; (3) construction camps or facilities (4) public safety and protection of property; (5) access roads and vehicle movement; (6) right-of-way clearing and site preparation; (7) tower design, tower erection, and conductor stringing; (8) timing of construction; (9) fences and cattleguards; (10) grounding; (11) erosion and sediment control; (12) archaeology and history; (13) control of fires; (14) waste disposal; (15) post-construction cleanup and reclamation; and (16) post-construction activity.

The CONTRACTOR shall conduct his operations in a manner to protect the quality of the environment. These standards contain provisions which shall be considered in all the CONTRACTOR's operations.

The CONTRACTOR's specific responsibilities are described below.

1.0 GENERAL GUIDELINES FOR CONTRACTOR PERFORMANCE

1.1 The CONTRACTOR shall formally and informally brief all contractor supervisors and employees on environmental constraints prior to and during construction, and shall post such reminders on job sites.

1.2 All activities of the CONTRACTOR shall comply with the Environmental Criteria for Electric Transmission Systems issued by U.S. Departments of the Interior and Agriculture, and with all local, state, and federal environmental and sanitary requirements.

2.0 PLANNING AND COORDINATION

Prior planning of all stages of construction and maintenance activities is essential to ensure that construction-related impacts will be minimized. It also provides the only means by which the line can adequately be evaluated and further mitigation suggested. It forces the CONTRACTOR to plan in advance the use of roads, timing of construction, and other details, and allows combination of roads and special use sites where possible. Prior planning by the CONTRACTOR shall include, but is not necessarily limited to, the following:

2.1 Maintenance and access roads shall be used jointly. Roads intended to be used as permanent maintenance roads should be initially designed as such.

2.2 Maintenance routes to all points on the line should be planned before construction ends.

2.3 All excavations for sand, gravel, clay, borrow or riprap materials may be subject to either the Open Cut Mining Act or Hard Rock Mining Act, and the CONTRACTOR shall apply for necessary permits at least sixty days in advance.

2.4 At least 30 days prior to beginning construction of the line, BPA's field representative and the CONTRACTOR shall meet with local officials and service providers in each affected comunity to advise these persons of the temporary increase in population, when the increase is expected, and where the workers will be reporting in or stationed. Maps of the line and access roads must be available so that service providers can determine where and when any problems could arise. Service providers contacted shall include, as a minimum, the county commissioners, city commissions or coucils, law enforcement officials, fire departments, emergency service providers, school officials, motel or other transient lodging operators, and a representative of the Chamber of Commerce.

If problems relating to inadequate housing, schools, or other facilities are identified, this information can be provided by the CONTRACTOR to immigrant workers, advising them to locate where there are adequate facilities. Arrangements can be made for emergency or other services that might be needed during construction. If trespass problems on new access roads are foreseen as a problem, the need for gates or other solutions can be determined. If road or bridge upgrading, maintenance, or signing for safety are identified as needs, plans can be made to meet them.

3.0 CONSTRUCTION FACILITIES

3.1 The preservation of the landscape and environment shall be a primary consideration in the location of temporary construction camps, storage areas, and building required in the performance of the work.

3.2 Construction sites and staging areas shall be kept as small as possible and shall be located where most environmentally compatible, such as in areas having the flattest available slope and lacking fragile soil or vegetation types. Full restoration and reshaping of these areas, including seeding and mulching, shall be made following Section 15 of the Guidelines -- "Post-Construction Cleanup and Reclamation."

3.3 All work areas shall be maintained in a neat, clean, and sanitary condition at all times.

4.0 PUBLIC SAFETY AND PROTECTION OF PROPERTY

4.1 Construction operations shall not close or obstruct any portion of any railroad, public road, public trail, or other property until the necessary permits have been obtained from the authorities having jurisdiction.

4.2 Sensitive areas which have been identified, and all cultivated and planted areas and vegetation such as trees, plants, shrubs, and grass on or adjacent to the right-of-way which do not interfere with the performance of work, shall be preserved.

4.3 Reasonable precautions shall be taken to protect, in place, all public land monuments and private property corners or boundary markers. If any such land markers or monuments are destroyed, they shall be reestablished and referenced in accordance with the procedures outlined in the "Manual of Instruction for the Survey of the Public Land of the United States: or, in the case of private property, the specifications of the county engineer.

4.4 Firearms are not permitted to be carried in any vehicle or by personnel involved in this project while he/she is on or in the vicinity of the project right-of-way. Violators of any state, federal, or international law protecting wildlife shall be referred to the proper authorities.

4.5 Guard structures shall be installed over all existing transmission lines, distribution lines, telephone lines, and public roads that will be crossed by the conductors.

4.6 Care shall be taken to ensure that all gates are reclosed after entry or exit and that landowners incur no losses due to negligence on the part of the CONTRACTOR or his employees. Gates shall be inspected and repaired and missing padlocks shall be replaced when requested by landowner.

4.7 Public travel through and use of active construction areas shall be discouraged.

4.8 BPA's right-of-way shall be expanded to avoid existing residences by a margin of 75 feet on either side of BPA's proposed 125 foot right-of-way.

4.9 The requirements of the Historic Preservation Act must be met, including adherence to the recommendations of the Council on Historic Preservation.

5.0 ACCESS ROADS AND VEHICLE MOVEMENT

5.1 Construction of new roads shall be held to the absolute minimum reasonably required to construct the facility. State, county, and other existing roads shall be used for construction access wherever possible. Where new roads must be built for construction access, they shall also serve permanent maintenance access requirements, subject to the desires of the landowners. The location of access roads and towers shall be established in cooperation with affected landowners and landowner concerns shall be accommodated wherever reasonably possible.

5.2 All new roads both temporary and permanent shall be constructed with the minimum possible clearing and soil disturbance to minimize erosion, as specified in Section II of these standards, entitled "Erosion and Sediment Control."

5.3 All roads shall be initially designed to accommodate the largest piece of equipment that will eventually be required to use them; road width shall be no wider than necessary.

5.4 During construction, unauthorized cross-country travel and the development of roads other than those approved shall be strictly prohibited. The CONTRACTOR shall be liable for any damage, destruction, or disruption of private property and land caused by his construction personnel and equipment as a result of unathorized cross-country travel and road development.

5.5 The limits and location of access for construction equipment and vehicles shall be clearly marked at each new site before any equipment is moved to the site. Construction foremen and personnel shall recognize these markers and understand the restrictions on equipment movement.

5.6 Roads shall be located near the center of the right-of-way insofar as possible, enabling traffic to avoid cables and conductors during the wire-stringing operation. Necessary crossing of the right-of-way centerline should be near towers for the same reason.

5.7 Where practical, temporary roads shall be constructed on the levelest land available. Where roads cross flat land they shall not be graded or bladed unless necessary, but may be flagged to show their location.

5.8 Construction activities and travel shall be conducted to minimize dust. Water, straw, wood chips, dust palliative, gravel, combinations of these, or similar control measures may be used. Oil or similar petroleum-derivatives shall not be used.

6.0 RIGHT-OF-WAY CLEARING AND SITE PREPARATION

6.1 Clearing of survey lines shall be done using hand methods or small power tools only. During clearing of the right-of-way, shrubs shall be preserved to the greatest extent possible. Where shrub removal is necessary, brush blades and not dirt blades shall be used to minimize disturbance to roots.

6.2 Right-of-way clearing shall be kept to the minimum necessary to allow construction access and to ensure that the line will not be damaged by falling trees. In no case should the entire nominal width of the right-of-way be cleared right up to the edge; clearing should instead produce a "feathered edge" right-of-way configuration, where only specified hazard trees and those that interfere with construction or conductor clearance are removed. Smaller trees should be allowed to grow on the right-of-way and beneath the conductors. Where possible, small trees and brush cut during construction should be chipped and scattered, and merchantable timber should be sold.

6.3 Scalping of the earth or any unnecessary disturbances shall not be allowed on any clearing, except in rocky areas, or on slopes where cuts and fills are necessary.

6.4 No timber shall be cut or destroyed outside the right-of-way without first obtaining permission from the appropriate landowner. The CONTRACTOR shall be held liable for any unauthorized cutting, injury or destruction to timber whether such timber is on or off the right-of-way. The extent of such liability shall be to reimburse the landowner for such timber at the current market value.

6.5 Cleared materials shall be cut as close to the ground as praticable, but not exceeding 6 inches above the ground. Stumps need not be removed unless they conflict with a structure or guy anchor.

6.6 Special logging techniques, hand clearing, or hand excavation may be required in certain highly sensitive or fragile areas (such as streams, scenic areas, highway crossings, and historical sites), as determined on a site-by-site basis.

6.7 Wherever appropriate, selective clearing shall be used to make curved, wavy, or irregular boundaries along the right-of-way limits. Where there is potential for long tunnel views of transmission lines or access roads, and where appropriate, special care shall be taken to screen the lines from view. This can be done by judicious use of screen planting. Where appropriate, special care shall be taken to leave a separating screen of vegetation where the right-of-way and highways and rivers are parallel (see USDI and USDA, "Environmental Criteria for Electric Transmission Systems").

6.8 All earth-moving equipment shall be operated only by qualified, experienced personnel.

6.9 The CONTRACTOR's general foreman shall make sure that crane pads are constructed in accordance with accepted construction practices, and that only one crane pad is constructed per tower site. Construction of crane pads on level ground is not necessary and shall not be allowed except for extreme conditions (such as soft or marshy ground).

6.10 No motorized travel on, scarification of, or displacement to stabilized talus slopes shall be allowed except where absolutely necessary.

6.11 The CONTRACTOR shall take reasonable measures to avoid the creation of noise levels that are safety or health hazards.

6.12 The CONTRACTOR shall take all necessary actions to avoid adverse impacts of sensitive areas which may include, but are not limited to, scenic, historical and archaeological areas, fish and wildlife refuges, water supply watersheds, and public recreational areas such as parks and monuments.

7.0 TOWER DESIGN, TOWER ERECTION, AND CONDUCTOR STRINGING

7.1 Helicopters shall be used to string socklines, transport tower structures, and to erect towers where warranted on an economic or environmental basis.

7.2 At certain wetlands heavily used by migratory birds, certain mesures may be required to reduce the incidence of wire strikes. These changes may include but are not necessarily limited to remount of overhead static wires, local habitat modification, or installation of devices such as flags or marker balls on static wires.

8.0 TIMING OF CONSTRUCTION

8.1 Construction and motorized travel may be restricted or prohibited at certain times of the year at critical sites which differ seasonally in sensitivity to construction-related disturbances. They includes sites:

a. in the vicinity of heavily used recreation sites on weekends or holidays;

b. on or near winter ranges or other areas important to moose, elk, deer, antelope, mountain sheep, and mountain goats during the appropriate months;

c. in or near streams during seasons of migratory fish spawning.

9.0 FENCES AND CATTLEGUARDS

9.1 All fences crossed by this powerline shall be provided with a gate not less than 16 feet wide. All fences crossed by the right-of-way or access roads shall be "H" braced, before the fence is cut.

9.2 Cattleguards, when required, shall be aligned at right angles with the roadway and shall be accompanied by an off-road gate wide enough for all construction equipment.

9.3 The CONTRACTOR shall immediately replace all fencing and gates that are cut, removed, damaged, or destroyed by him with new materials to the original standard, except that undamaged gates may be reused.

9.4 Reasonable requests of affected landowners regarding placement of fences, gates or cattleguards to improve access or to prevent trespass shall be followed.

10.0 GROUNDING

10.1 Barbed wire and woven wire fences on the right-of-way shall be grounded. At a minimum, fences which cross the right-of-way shall be grounded on each side of the gate opening and at each edge of the right-of-way. Fences which run on the right-of-way parallel to the centerline shall be grounded at a maximum of 200 foot intervals.

10.2 All metallic objects other than fences which are on the right-of-way, such as buildings with metallic roofs or sides and metallic piping systems installed above ground, shall be adequately grounded.

10.3 Generally, metallic objects off the right-of-way shall not require grounding; however, each metallic installation insulated from ground shall be reviewed on an individual basis to see if grounding is needed.

11.0 EROSION AND SEDIMENT CONTROL

11.1 Clearing and grubbing for roads and rights-of-way and excavations for stream crossings shall be carefully controlled to minimize silt or other water pollution downstream from the rights-of-way. Sediment retention basins may be required if silting occurs.

11.2 Roads shall cross drainage bottoms at sharp or nearly right angles and level with the streambed gradient whenever possible.

11.3 Under no circumstances shall streambed materials be removed for use as backfill, embankments, or for other construction purposes. No excavations shall be allowed on any

river or live stream channels or floodways at locations likely to cause detrimental erosion or offer a new channel to the river or stream at times of flooding.

11.4 No blasting shall be allowed in streams. Blasting may be allowed near streams if precautions are taken to adequately protect the stream from debris.

11.5 The CONTRACTOR shall maintain roads while using them. All ruts made by machinery shall be filled to prevent channeling. In addition, the CONTRACTOR must take measures to prevent the occurrence of erosion caused by wind or water during and after use of these roads. Some erosion-preventive measures include but are not limited to installing or using cross logs, drain ditches, water bars, and wind erosion inhibitors such as water, straw, gravel, or combinations of these items.

11.6 The CONTRACTOR is required to prevent material from being deposited in any watercourse or stream channel. Where necessary, measures such as hauling of fill material, construction of temporary barriers, or other approved methods shall be used to keep slash, excavated materials, and other extraneous materials out of watercourses. Any escaped fill, slash, etc., shall be removed immediately from watercourses.

11.7 Where required, coarse rock encountered in the excavation shall be used as far as practicable for constructing the sides of new embankments adjacent or parallel with any affected stream where such material may serve as protection against slope or channel erosion. The CONTRACTOR shall be responsible for the stability of all embankments made under the contract until final acceptance of the work. Embankments and backfills shall contain no muck, frozen material, large roots, sod, or other deleterious matter. The CONTRACTOR shall prevent the escape of fill material by the construction of toe ditches or by the erection of rock, boulder, earth, or log barriers at the toes of embankments, or by other suitable methods.

11.8 Culverts or arch bridges shall be installed at all crossings of flowing or dry watercourses where fill is likely to wash out during the life of the road. Culvert or bridge installation is prohibited in areas of important fish spawning beds and during specified fish spawning seasons on less sensitive streams or rivers. Culverts shall be of sufficient size to handle approximately 15-year floods. Culvert size shall be determined following procedures given in the Hydraulics Manual of the Montana Department of Highways (Peil and Weaver 1975), or by equivalent standard procedures which take into account the variations in vegetation and climatic zones in Montana, the amount of fill, and the drainage area above the crossing.

11.9 No fill material other than that necessary for road construction shall be piled within the high water zone of streams where floods can transport it directly into the stream. Excess floatable debris shall be removed from areas immediately above crossings to prevent obstruction of culverts or bridges during periods of high water.

11.10 No skidding of logs or driving of vehicles across a perennial watercourse shall be allowed, except via authorized construction roads. No perennial watercourses shall be blocked or diverted.

11.11 Construction activities shall use methods that will prevent accidental spillage of solid matter, contaminants, debris, petroleum products, and other objectionable pollutants and wastes into watercourses, lakes, and underground water sources. Catchment basins shall be installed at storage areas to contain accidental spills of fuel, chemicals, oil, etc.

11.12 When operations in a work area are complete, all temporary structures or fills installed to aid stream crossing shall be removed and the thread of the stream reestablished to prevent future erosion.

11.13 All temporary dams built on the right-of-way shall be removed within five years of their construction or be upgraded to permanent structures with either spillways or culverts, and a continuous sod cover on their tops and downstream slopes. Spillways may be protected against erosion with riprap or equivalent means.

12.00 ARCHAEOLOGY AND HISTORY

12.1 BPA shall engage a competent archaeologist familiar with the area to designate areas likely to be of archaeological and historical significance, and to design an appropriate field survey. Such field work and appropriate mitigating measures shall be completed for any finds prior to the start of construction.

12.2 If any artifacts or items of apparent archaeological or historic significance are discovered before or during construction, care shall be taken not to disturb the artifacts or surrounding area, and the archaeologist shall be notified immediately.

12.3 Any relics, artifacts, fossils or other items of historical or archaeological value shall be preserved in a manner agreeable to both the landowner and the State Historic Preservation Officer.

13.0 CONTROL OF FIRES

13.1 A fire plan shall be proposed that sets forth in detail the plan for prevention, control and extinguishing of fires on and near the project area.

13.2 The CONTRACTOR shall comply with any county, town, state or governing municipality having jurisdiction regarding fire laws and regulations.

13.3 Blasting caps and powder shall be stored only in approved areas and containers and always separate from each other.

13.4 The CONTRACTOR shall provide necessary equipment for fire prevention and suppression. Spark arresters and additional mufflers on some engines may be required in areas of high fire danger.

13.5 The CONTRACTOR shall properly store and handle combustible material which could create objectionable smoke, odors, or fumes. The CONTRACTOR shall not burn refuse such as trash, rags, tires, plastics, or other debris, except as may be permitted by the county, town, state, or governing municipality having jurisdiction.

14.0 WASTE DISPOSAL

14.1 General cleanup of the right-of-way and access roads shall be done by the CONTRACTOR for the duration of the project.

~~14.2 Disposal of any materials, waste, effluents, trash, garbage, oil, grease, chemicals, etc., shall be subject to the approval of the landowner.~~

14.2 BPA must use licensed solid waste disposal sites for disposal of its wastes. Inert materials (Group III wastes) may be disposed of at Class III landfill sites; mixed refuse (Group II wastes) must be disposed of at Class II landfill sites.

~~14.3 All used oil or other petroleum products shall be hauled away. There shall be no release of crankcase oil or other toxic substances into streams or the soil.~~

14.3 Emptied pesticide containers or other chemical containers must be triple rinsed to render them acceptable for disposal in Class II landfills or for scrap recycling pursuant to ARM 16.44.202(12) for treatment or disposal.

14.4 All used oil shall be hauled away and recycled or disposed of in accordance with 14.2 through 14.4 above. There shall be no release of crankcase oil or other toxic substances into streams or soil.

14.5 All waste materials resulting from the construction and operation of the BPA transmission line project for either the primary location or alternate locations which constitute a hazardous waste defined in ARM 16.44.303, wastes containing any concentration of polychlorinated biphenyls must be transported to an approved designated hazardous waste management facility (as defind in ARM 16.44.202(12) for treatment or disposal.

~~14.6 All non-combustible wastes such as conductor, ceramic or metal scrap shall be hauled away or buried. Permission shall be obtained from the landowner before burial of these wastes.~~

14.6 Sanitary waste shall not be discharged into streams or any streambeds. The CONTRACTOR shall provide refuse containers and sanitary chemical toilets, convenient to all principal points of operation. These facilities shall comply with applicable federal, state, and local health laws and regulations.

14.7 Water used in embankment material processing, aggregate processing, concrete curing, foundation and concrete lift cleanup, and other waste water processes shall not be discharged into surface waters.

14.8 Complete disposal of all slash made by the project shall be required pursuant to 76-13-401 through 76-13-413 MCA. Some slash may be used in constructing barriers to inhibit travel on closed roads along the right-of-way.

~~14.9 Combustible wastes such as packaging material shall be hauled away and disposed of upon leaving any work area.~~

14.9 Generally, combustible wastes shall not be burned. In instances where disposal by burning seems prefereable, it shall require the prior approval of the landowner, and shall be done with small fires only to dispose of construction waste. BPA must obtain a Montana Open Burning Permit.

14.10 BPA must dispose of pesticide residue and pesticide containers in accordance with ARM 16.20.633(9).

15.0 POST-CONSTRUCTION CLEANUP AND RECLAMATION

15.1 Subject to the desire of the landowner and the integrity of the tower foundation and anchors, all signs of temporary construction facilities such as haul roads, work areas, buildings, foundations or temporary structures, stockpiles or excess or waste materials, or any other vestiges of construction shall be removed and the areas restored to as natural a condition as is practical.

15.2 Grading and scarifying of roadways shall be required where appropriate and required by the landowner to restore the area to near natural conditions that will permit the growth of vegetation and discourage future traffic.

15.3 Any landscape feature scarred or damaged by equipment or operations shall be restored as nearly as practical to its original condition. Bare areas created by construction activities will be reseeded to prevent soil erosion.

15.4 In areas where no cut or fill was made, closure of roads, subject to landowner approval, shall be done by installing signs, constructing rock barriers, soil berms, planting trees, or other approved means after completion of scarifying, water-barring and revegetation in these areas.

15.5 Replacement of earth adjacent access roads crossing streams shall be at slopes less than the normal angle of repose for the soil type involved.

15.6 Disturbance of drainage bottoms shall be minimal, and all drainage bottoms shall be restored to their preconstruction gradient and width to prevent accelerated gully erosion.

15.7 Cross drains and water bars shall be added at an angle and as frequently as appropriate to satisfy road grades.

15.8 Interrupted drainage systems shall be restored for all cleared centerlines.

15.9 Species used in reseeding shall be as specified in the accompanying table.

15.10 All litter is to be removed from the right-of-way and along access roads leading to the right-of-way within 30 days of completion of wire stringing and splicing. If requested by the landowner, BPA shall provide for removal of any additional debris after this initial cleanup.

Seeding Prescriptions

	Species	Seeding lbs/acre	Method
Dry site Low elevation	Western wheatgrass (Agr smi)	4.5	Drill[4]
	Bluebunch wheatgrass (Agr spi)	4.5	
	Thickspike wheatgrass (Agr das)	5.0	
	Prairie sandreed (Cal lon)	2.0	
	Little bluestem (Sch sco)[1]	-	
	Sideoats grama (Bou gra)[2]	3.0	
	Blue Grama (Bou gra)[2]	-	
	Eski sainfoil (Ono vic)	1.0	
Dry site High elevation	Bluegrass wheatgrass (Agr spi)	5.0	
	Green needlegrass (Sti vir)	3.0	
	Mountain brome (Bro mar)	8.0	
	Blue grama (Bou gra)	1.0	
	Little bluestem (Scho sco)	2.0	
	Eski Sainfoil (Ono vic)	1.0	

Wet site	Switchgrass (Pan vir)	6.5
Low elevation	Reed canarygrass (Pha aru)	11.5
	Sand dropseed (Spo cry)	1.0
	Alkali sacaton (Spo air)[3]	-
	Eski sainroil (Ono vic)	1.0
Wet site	Garrison creeping meadow foxtail (Alo aru)	2.0
High elevation	Mountain brome (Bro mar)	10.0
and	Spike trisetum (Tri spi)	3.0
Alpine	Tufted hairgrass (Des cae)	2.0
	Orchard grass (Dac glo)	2.0
	Alpine timothy (Phl alp)	1.0

A If prairie sandreed is unavailable use little bluestem at an equivalent seeding rate to prairie sandreed.

B If sideoats grama is unavailable use blue grama at 1/3 the seeding rate of sideoats grama.

C If sand dropseed is unavailable use alkali sacaton at 1/3 the seeding rate of sand dropseed.

D If seed is hand-broadcast use twice (2X) the drill rate.

15.11 Any existing waste material moved or disturbed shall be placed on the right-of-way so that it does not form fire hazards or stock barriers, and not block access to the right-of-way or to structure sites. Waste material includes disposable material such as tops, limbs, brush, uprooted stumps, unmerchantable logs, buildings designated for disposal, building debris, and other disposable debris. The degree of disposal to be performed is dependent on the existing land use. Occasional tops, limbs, and brush to 3 inches in diameter and to 3 feet in length may be left on other than cropland and residential land.

15.12 Piling and windrowing of material for burning shall be by tractor equipped with a forked clearing blade except where equipment is prohibited. In areas where such equipment is prohibited, methods that will prevent soil from being included in the material to be burned shall be used to minimize destruction of ground cover, and to minimize erosion. Piles shall be relatively small and compact so as to minimize danger to timber and damage to ground cover.

15.13 BPA is responsible for correcting cultivated land compacted by equipment and other land as requested by the landowner or managing agency.

15.14 If difficulties in revegetation are anticipated, stockpiling of topsoil to be spread on road cuts prior to reseeding is encouraged.

15.15 Sufficient seeds and fertilizer, of specific percentage purity, germination, and inert material, shall be ordered early enough to ensure reseeding during the first agricultural planting season after construction ends for each segment of the line.

15.16 Where appropriate, hydroseeding or drilling and seeding shall be used to aid revegetation. Mulching with straw or wood chips shall be used where necessary.

15.17 Revegetation shall not be considered complete until the following criteria are met:

a. In rangeland, coverage of perennial species shall be 30% or more of that on adjacent rangeland the year following revegetation, and 90% or more of the coverage of adjacent rangeland within the five years following revegetation.

b. In forest land, revegetated land exclusive of the right-of-way or permanent roads shall be stocked with trees by the end of five years so that the approximate stocking level of adjacent forest, or canopy closure, whichever is less, will be attained at maturity.

16.0 POST-CONSTRUCTION

As follow-up after construction, the following shall be done, subject to the desires of the landowner:

16.1 Vegetation, particularly that of value to fish and wildlife, which has been saved through the construction process and which does not pose a hazard to the powerline, shall be nurtured and allowed to grow on the right-of-way.

16.2 Vegetation cover shall be maintained, if appropriate, in the areas immediately adjacent transmission towers.

16.3 Native trees, shrubs, herbs and grass shall be kept; where ecologically appropriate in critical areas, vegetation of this type shall be placed under the direction of the appropriate land management agent or a qualified ecologist.

16.4 If and where permitted, access roads and service roads shall be maintained with grass cover, water bars, cross drains, and the proper slope in order to prevent soil erosion.

16.5 Maintenance inspections shall be timed so that routine maintenance will be done when access roads are firm, dry or frozen. Maintenance vegetative clearing in particularly critical areas shall be done on a short cycle to satisfy minimal requirements and to avoid heavy, long-term cutbacks.

16.6 Aircraft shall normally be used to inspect the powerline facility. Aerial inspection and ground maintenance activities of the power line facility shall include observations of soil erosion problems, fallen timber, and conditions of the vegetation that require attention.

16.7 BPA should advise all beekeepers along the proposed final route of the known effects of electrical fields on bees and of the uncertainties involved. If necessary, BPA shall assist the beekeepers in relocating hives prior to energizing the transmission line.

16.8 When radio and TV interference problems occur as a result of the construction or operation of the transmission line, BPA should resolve the problems by appropriate methods, including mechanical corrections to insulators and antennas, installation of remote antennas or installation of repeater stations.

16.9 If noise problems occur as a result of construction or operation of the transmission line, BPA should resolve the noise problems by reconductoring or purchase of property, where appropriate.

17.0 USE OF PESTICIDES RESTRICTED

The following restrictions apply to the use of pesticides as defined in ARM 16.20.603(13):

17.1 No pesticides will be used in the right-of-way of BPA's transmission line corridor unless BPA is directed by the governing Montana county weed board, through its supervisor, to apply pesticides to control noxious weeds, as defined in section 7-22-2101(3), MCA, or unless BPA is requested by a landowner to apply pesticides to his property to control noxious weeds, as defined in section 7-22-2101(3), MCA, and defined by each weed board.

17.2 No pesticides as defined in ARM 16.20.603(13) will be used on ~~lands in the Deer Lodge Forest~~ Natinal forest lands unless for the control of noxious weeds as defined in section 7-22-2101(3), MCA, and then only with the prior concurrence of a Montana county weed board.

~~17.3 Neither Tordon nor any pesticide containing picloram will be used on any land, regardless of ownership, crossed by the BPA transmission line.~~

17.3 Only hand-spot spraying by land vehicle and through use of low pressure nozzles to prevent drift is permissible. Aerial spraying is prohibited.

17.4 Pesticides must be applied according to label specifications and by an applicator licensed by the State of

Montana. Only pesticides registered in compliance with applicable federal and state laws may be applied.

17.5 Pesticides shall not be applied during heavy rains or threat of heavy rains. Filter strips shall be left along all identifiable stream channels ~~as provided on page 6-79 of the Final Supplement EIS.~~ Pesticides shall not be used in any public water supply watershed identified by the Department of Health and Environmental Sciences.

17.6 All surface areas disturbed by spraying activities shall be reclaimed. Reclamation shall be coordinated with the owners of the land in question.

17.7 BPA shall annually submit to DNRC a report or environmental impact statement concerning the pesticides to be sprayed on the transmission line right-of-way. The report or EIS shall be submitted at least 30 days prior to any proposed spraying activities. The report or EIS shall include, as a minimum, the following:

a. A legal and geographical description of each area to be sprayed.

b. The pesticide to be sprayed, including the types, mixtures and concentrations of the chemicals to be sprayed.

c. The target weeds to be sprayed.

d. The method of application.

e. The name of the licensed applicator who will conduct each spraying operation.

f. The reclamation efforts, if any, that will be undertaken.

g. The measures that will be taken to prevent pesticides from entering state waters as defined in the Montana Water Pollution Control Act, Section 75-5-101, et seq., MCA.

APPENDIX C

INTERAGENCY MEETING

APPENDIX C

In November 1982, represantatives of DNRC, BPA, BLM, and USFS met in Helena, Montana to develop a racommendation for siting BPA's proposad 500-kV transmission line. Earlier analysis by BPA and DNRC eliminated all but three of the possible Taft routes, two possible Plains routes, and one Hot Springs route. Consansus was sought regarding the relative suitability of some segments of these main routes. The interagency group would recommend the best location for BPA's proposed 500-kV line on the basis of environmental, social, economic, engineering, and public concerns and list alternative routes in the order of preference to meet federal regulations. Transcripts of this meeting are on file at DNRC. The interagency team recommended the Taft South Route as the environmentally preferred and Taft North Route as the second preferred route. This appendix summarizes the interagency team's findings on segments and routes.

DNRC and BPA used different methods and criteria to evaluate routes, so a jointly acceptable set of criteria called rasourca topics was developed. BPA staff members met with their counterparts on the DNRC staff to deal with important siting concerns for each resource. Each resource topic was discussed until differances were resolved. The group ultimately adopted thirtean rasource topics as siting criteria. Table 12 lists thase resource topics and the information considered under each.

TABLE 12. RESOURCE CATEGORIES USED FOR EVALUATING ROUTE ALTERNATIVES

SITING CONCERNS	ITEMS USED TO MEASURE CONCERN
Recreation (Visual Impacts)	Kinds of important recreational settings in the study area were: (1) Wilderness; (2) National Trails and Rivers; (3) Intensive Recreation Sites and Areas; (4) Roadless; (5) Scenic Roads; (6) Historic Sites; (7) High Value Fisheries; (8) Dispersed Use: Public Lands; (9) Dispersed Use: Private Lands; and (10) Non-scenic Roads (viewers in highway traffic).
Land Productivity (Agriculture)	Land permanently removed from production by tower gases, land permanently removed from production by access roads, and loss of a year's land production required for construction.
Land Productivity (Forestry)	Loss of forest productivity due to right-of-way and access road construction. Attention was given to conflicts with management for timber production.
Residential/Commercial/Recreation Development Potential	Effects on land development potential.
Management Conflicts	Effects on areas managed for special purposes, such as recreation, including USFS and BLM planning units.
Residential Impacts	Visibility of the transmission line, the nuisance effects of low-level noise and radio/TV interference, and inconveniences such as noise and dust caused by construction; perceived effects on health and safety and perceived effects on the values of land within 1/2 mile of the line were considered.
Agricultural Inconveniences	Inconveniences in farming practices such as disturbance with overhead sprinkling systems and increased potential for trespass on private land.

TABLE 12 (cont.)

SITING CONCERNS	ITEMS USED TO MEASURE CONCERNS
Social Conflict	Local sensitivity to route selection and the stress resulting from the appraisal and acquisition of easements based on number of landowners and residences near the proposed line.
Cultural Concerns	Impacts to prehistoric and historic sites.
Impacts to Aquatic Habitats	Risk of erosion from access roads and slopes over 30 percent; measured impacts to streams, high-value fishery streams, and numbers of perennial streams.
Impacts to Terrestrial Habitats	Loss of big game winter range and big game summer security areas, endangered and threatened species, and the possibility of waterfowl flying into the line; fragility of soils and vegetation at elevations over 6,000 ft.
Construction Constraints	Steep slopes and problem soils that could cause restrictions on construction.
Engineering	Route suitability based on line length, amount of new access roads, construction difficulties, and steel costs.

DETERMINING PREFERRED ROUTES AND ROUTE SEGMENTS

The interagency team was divided into resource topic groups to discuss the beneficial and adverse impacts of each siting alternative on a particular resource. The resource topic group discussions were recorded by a secretary and reported to the entire group by a spokesperson. The task for each resource group was to (1) rank each option, (2) list any special considerations, (3) list areas of disagreement between the experts, (4) list important factors in each resource topic that were used to rate and rank the alternatives, and (5) specify severity (low, moderate, or high) of potential impacts to their resource. The resource topic group's findings were recorded on a master matrix and used by the whole group to determine the preference in alternatives. Consensus on decisions was achieved through discussion. The discussions of the segments and routes evaluated at this interagency meeting are presented in the following sections. Segments and routes are depicted in figure 1, chapter 1.

SEGMENT 102 VERSUS SEGMENTS 103 AND 104

Segment 102 was common to BPA's Plains and Hot Springs routes. Alternate segments 103 and 104 were suggested by ONRC so that the route would parallel the MPC 230-kV line that lies in segment 104. Segments 103 and 104 were common to ONRC's Taft North and Hot Springs routes.

If segments 103 and 104 were chosen, there would be an extended view of the transmission line from Interstate 90. Option 102 would reduce impacts to aquatic habitats but would increase potential impacts to other wildlife habitat. Option 102 would be slightly less expensive to construct than options 103 and 104. There would

be less severe visual impacts on 102 and it would reduce potential interference with farming activities. Significent differences between segment 102 end segments 103 and 104 ere displeyed in table 13.

TABLE 13. INTERAGENCY TEAM FINDINGS ON SEGMENT 102 VS. SEGMENTS 103, 104

	BPA Segment 102 *Preferred	DNRC Segments 103 and 104
(Visual) Recreation	Fewer Visuel impects	extended view of trensmission line from I-90
Impacts to Aquetic Habitets		crosses more straems higher erosion risk
Impacts to Terrestriel Hebitets	Crosses secure big game range Requires extansive accass roed construction	less risk to wildlife - crosses less big-gema range
Cost	Slightly less expensive then 103 end 104	
Agriculturel Inconvenience	Crosses less croplend	

* only if mitigeting meesures are implemented.

Option 102 wes fevored beceuse it would reduce construction cost end difficulty, reduce visual impects, and present minimal inconvenience to farming. It was recommended with the stipuletion thet meesures to reduce impacts be implemented during construction end operation of tha line in this erae.

SEGMENT 137 VERSUS SEGMENTS 128 AND 136

These segments are the altarnatives for a stream crossing at Miller Creek, southwest of Clinton. BPA's Taft Route includes segment 137; sagments 128 and 136 are part of DNRC's Taft South and Plains routes and would.reduce impacts to aquatic habitats and locate the line in less steep and difficult tarrain.

Major differences in potential impacts on the segments are shown in table 14 and involve cultural resources, aquatic habitat, and anginearing concerns. An archaeological site, which could be avoided during centerline selection lies on segment 137 and aquatic impacts could occur on segment 137 because of the steep location of the lina and towers in a drainage. Segments 128 and 136 are longer and would requira a sharp turn south of Miller Peak, resulting in 50 percent greater construction cost than segment 137.

TABLE 14. INTERAGENCY TEAM FINDINGS ON SEGMENT 137 VS. SEGMENTS 128 AND 136

	BPA	DNRC
	137 Preferred	128 and 136
Impacts to Cultural Resources	Archaeological site could easily be avoided	No known historic or prehistoric sitas
Impacts to Aquatic Habitats	High erosion risk	
Cost		Would cost 50 percent more than 137
Physical Constraints	Easily constructed	Longer difficult route with sharp angle turn

It was decided that increased cost was the most severe and least mitigable consequence of choosing 128 and 136. Segment 137 was preferred because potential impacts to aquatic habitats and cultural resources could be mitigated.

LRA-A VERSUS SEGMENT LRA-C

BPA's Taft Route includes LRA-A and DNRC identified segment LRA-C to avoid Maxville and reduce impacts on residences through the Drummond Valley.

LRA-C crosses historic and prehistoric sites, modifying the line to avoid the sites would be expensive and time consuming at best, and could prove impossible. Preserving or excavating the sites to comply with Federal Historic Preservation legislation could delay the energization of Colstrip.

Both options pass within 0.25 mi of many residences, and on LRA-C the transmission line would be visible from the Drummond Valley. Both segments would put the transmission line across scenic highway 10A, but BPA's segments would cross landforms amenable for the reduction of visual impacts. LRA-A would require construction in steep terrain and although LRA-C avoids steep terrain it would require as much access road construction as LRA-A.

TABLE 15. INTERAGENCY TEAM FINDINGS ON RA-A VS LRA-C

	BPA LOCAL ROUTING ALTERNATIVE-A LRA-A SEGMENTS (118,129,130,132,135)	DNRC LOCAL ROUTING ALTERNATIVE-C LRA-C Preferred
Impacts to Residences	6 residences within 1/4 mi but views are limited.	Fewer residences within 1/4 mi but thare are more residences outside 1/4 mi with views which are more extendad.
Impacts to Recreation (Visual Impacts)	Crosses more public land, highar level of dispersed recreation use, bettar crossing of scenic Highway 10A with greater potential for mitigation.	Crosses more private land, crossing of Highway 10A worse, less potential for impact reduction.
Impacts to Cultural Resourcas	Cultural impacts mostly visual and avoidable.	Gold Creek area to Flint Creek Valley area of numarous cultural resources.
Agricultural Inconvenience	Localized inconveniences in the Maxville area.	Significantly more agricultural and private land crossed, potential for inconveniences and trespass greater along entire segment

The interagency team recommended segment LRA-A to prevent a delay in the energization of Colstrip. Mitigating measures were recommended on LRA-A to reduce the hazards of construction in steep terrain including canterline studies for tower placement and access road location.

PLAINS NORTH VS PLAINS SOUTH

The Plains South Route was DNRC's preferred option to the Plains substation. It coincides with much of the Taft South Route. It was developad to reduce social and environmental impacts on BPA's Plains North Route.

The Plains North Route would cross less highly productive timberland than the other route and affect more residences. The significant differences between the Plains North and South routes are shown in table 16.

TABLE 16. INTERAGENCY TEAM FINDINGS ON PLAINS NORTH VS PLAINS SOUTH

	PLAINS NORTH Segments 101, 102, 107, 108, 109 110, 111, 113, 115, 116, 1, 6	PLAINS SOUTH Preferred Segments 118, 129, 130, 132, 134, 135, 137, 138, 139, 142, 143, 144, 147, 148
Impact on Residences	At least 7 problem areas, 1,100 residences within 2 mi, 2 houses in right-of-way, 59 within 1/4 mi, 103 within 1/4 to 1/2 mi, 349 within 1/2 to 1 mi, 587 within 1 to 2 mi.	4 problem areas, 281 residences, 0 houses in right-of-way, 14 within 1/4 mi, 33 within 1/4 to 1/2 mi, 49 within 1/2 to 1 mi, 185 within 1 to 2 mi.
Social Conflict Areas	8 areas of social conflict, 67.9 mi of private land	6 identified social conflict areas, 37.3 mi of private land crossed.
Land Productivity Forestry		Impact risk - high; crosses more areas of high to moderate forest productivity classes.
Development Potential	Crosses land with high development potential.	Few areas with development potential.

On the Plains North Route, 1,100 houses lie within 2.0 mi of the proposed centerline, while only 281 houses are within the same distance of the Plains South proposed centerline. Plains South is the preferred route because it would affect fewer people and homes than the Plains North Route.

TAFT SOUTH VERSUS TAFT NORTH

BPA proposed the Taft South Route which would result in impacts on wildlife and aquatic habitats from Garrison to Miller Creek. DNRC proposed the Taft North Route which would cause visual impacts, affect cultural resources, and pass populated areas. The significant differences between the Taft routes are displayed in table 17.

Gold Creek, Drummond, and Clinton are near the Taft North Route; eighty-seven residences are within 2.0 mi of its proposed centerline. In the Gold and Schwartz creek areas mitigating measures to reduce visual impacts would either be difficult to implement, or if implemented, not particularly successful. Landforms along the Taft North Route would not allow screening of the transmission lines and would cause severe visual impacts.

The Taft North Route would cross fewer streams and less secure summer wildlife habitat than Taft South. Taft North would cross more winter range, at lower elevations, but impacts to winter wildlife habitat would be easier to mitigate.

TABLE 17. INTERAGENCY TEAM FINDINGS ON TAFT NORTH VS TAFT SOUTH

	BPA TAFT SOUTH (Preferrad)	DNRC TAFT NORTH
Racreation Impacts to (Visual Impacts)	Crosses scenic highway and Rock Creak.	Crosses many more recreation sites, parallels the Clark Fork River and I-90 for 24 mi.
Impacts to Residences	48 residences within 2.0 mi	87 residences within 2.0 mi, extanded views of line
Impacts to Land Productivity - Forestry	Crosses 52 mi of forested land, classified as medium productivity	Crossas 31 miles of forested land, classified as low productivity.
Impacts to Cultural Resourcas	Many more recorded cultural resource sites and a greater potential for site discoveries	Few known archaeological and historical sites.
Impacts to Aquatic Habitats	High access road requirements with a large increase in erosion risk.	Fewer streams crossed, less steep terrain, lower erosion risk.
Impacts to Tarrestrial Habitats	Crosses more secure big game summer ranga, highar access road require-ments, more araas over 6,000 ft in elevation, difficult to reclaim.	Crosses more secure big game winter range, mitigation potential is high.

Reaching a consansus on tha choice between Taft North and Taft South was the interagency team's most difficult task. The Taft North Route would cause social impacts while the Taft South Route would cause impacts on aquatic, cultural, and tarrestrial habitats. Aftar considerabla discussion the consensus was to minimize impacts to people. Impacts to wildlife concerns were recognized as severe along both Taft routes. Centerlina studies on tower and accass road location, and timing of construction were recommended to reduce wildlifa and aquatic impacts on the prefarred Taft South routa.

TAFT, PLAINS, AND HOT SPRINGS RANKING

Federal procedure requires a ranking of the three routes in order of preference, so that an alternative route could be implemented quickly if a contingency arose that would prevent construction of the preferred option. Table 105 shows the differences between the Taft, Plains, and Hot Springs routes. The Taft Route would would affect fewer people than the other two routes. BPA's preferred option, Taft South, would be the best route overall but could cause social impacts in Maxville. As Table 19 shows, the Taft route would be the most expensive to construct, costing $22 million more than the least expensive Hot Springs route and $10 million more than the intermediate Plains Route.

The Taft Route was selected as the best plan, Plains was ranked as the second best plan, and Hot Springs was the third best plan.

Table 18 shows that the Taft route was favored in six resource concerns and the second-preferred in all other resource concerns except cost/engineering but as shown in table 19, the Taft route would be the most expensive to build. The concern given the most importance by the interagency team was the potential effects of the transmission line on people. The Taft Route would cross only five heavily populated areas and about 20 mi less privately-owned land than the other routes and the Taft Route would avoid residences. The Taft Route is preferred because of its overall high rankings and because it has the least potential for adversely affecting people.

TABLE 18
BPA-DNRC RANKING AND RATING OF THE TAFT, PLAINS, AND HOT SPRINGS ROUTES

	Routes and Ranking		
SITING CRITERIA	TAFT (PREFERRED)	PLAINS	HOT SPRINGS
IMPACTS TO RECREATION (VISUAL IMPACTS)	RANK 1 Crosses least sites of any route	RANK 2 Sites common to Taft route	RANK 3 Crosses most intensive use sites of any route
AGRICULTURAL PRODUCTIVITY	RANK 1 Crosses 39 mi productive land, 25 mi agricultural land, 14 mi rangeland	RANK 2 Crosses 30 mi productive land, requires 20 acres for substation, crosses 20 mi agricultural land, 19 mi rangeland	RANK 3 Crosses 117 mi productive land, crosses 54 mi agricultural land (18 mi irrigated), crosses 63 mi rangeland
TIMBER PRODUCTIVITY	RANK 2 Crosses 116 mi of intensive timber management areas, requires many access roads	RANK 3 Crosses 113 mi of intensive timber management areas, requires many access roads	RANK 1 Crosses 83 mi of intensive timber management areas, requires few new access roads
RESIDENTIAL DEVELOPMENT POTENTIAL	RANK 1 Development expected in or near Miller Creek, St. Regis	RANK 2 Development expected in or near Miller Creek, Thompson Falls, Paradise	RANK 3 Development expected in or near Rattlesnake, Butler, Grant and Ravalli Creeks, Evaro, Arlee, Dixon, Thompson Falls, Missoula
IMPACTS TO RESIDENCES	RANK 1 308 houses within 2 mi of proposed centerline, 47 houses within .50 mi	RANK 2 972 houses within 2 mi of proposed centerline, 119 within .50 mi	RANK 3 2009 residences within 2 mi of proposed centerline, 310 within .50 mi
TRESPASS RISK	RANK 2 620 mi of access roads required	RANK 1 620 mi of access roads required	RANK 3 444 mi of access roads required
SOCIAL CONFLICT	RANK 1 Crosses 85 mi of private land, and six communities	RANK 2 Crosses 103 mi of private land, and eight communities	RANK 3 Crosses 162 mi of private land, 19 mi of reservation land, and twelve communities
CULTURAL RESOURCE IMPACTS	RANK 1 Few historic or archaeologic sites	RANK 2 Few historic or archaeologic sites	RANK 3 Seven sites with archaeologic or religious significance
IMPACTS ON AQUATIC HABITATS	RANK 2 Crosses many small drainages at elevations over 6000 ft	RANK 3 Crosses many small drainages and high quality streams at elevations over 6000 ft	RANK 1 Fewer streams than other routes and lower elevations
IMPACTS ON WILDLIFE HABITATS	RANK 2 * High access requirements, crosses high elevations	RANK 2* High access requirements, crosses high elevations, would be slightly worse than Taft for endangered species	RANK 1 Less access requirements, lower elevations
GEOLOGIC CONSTRAINTS	RANK 2* Moderate geologic constraints	RANK 1 Moderate geologic constraints, fewer problem soils areas	RANK 2* Moderate geologic constraints
ENGINEERING AND COST	RANK 3 $222 million, new substation	RANK 2 $212 million, more dead-end towers	RANK 1 $200 million, flatter terrain

*The difference between routes was negligible

TABLE 19

CONSTRUCTION COSTS OF BPA'S PROPOSED TRANSMISSION LINE FROM GARRISON SUBSTATION TO THE BELL SUBSTATION
(Costs are Expressed in 1982 Dollars Without Overhead)

Garrison-Taft-Bell	
Line Cost	
Garrison-Taft	$136,278,000
Taft-Bell	38,984,000
Taft Loop	2,650,000
Total Line Cost	$177,912,000
Substation Cost	
Garrison Sub	$ 16,371,000
Taft Sub	20,342,000
Bell Sub	7,500,000
Total Substation Cost	$ 44,213,000
TOTAL PROJECT COST	$222,125,000
Garrison-Plains-Bell	
Line Cost	
Garrison-Plains	$116,838,000
Plains-Bell	57,456,000
Total Line Cost	$174,294,000
Substation Cost	
Garrison Sub	$ 16,008,000
Plains Sub	14,415,000
Bell Sub	7,500,000
Total Substation Cost	$ 37,923,000
TOTAL PROJECT COST	$212,217,000
Garrison-Hot Springs-Bell	
Line Cost	
Garrison-Hot Springs	$ 99,041,000
Hot Springs-Bell	65,381,000
Total Line Cost	$164,422,000
Substation Cost	
Garrison Sub	$ 16,008,000
Hot Springs Sub	12,942,000
Bell Sub	7,500,000
Total Substation Cost	$ 36,450,000
TOTAL PROJECT COST	$200,872,000

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